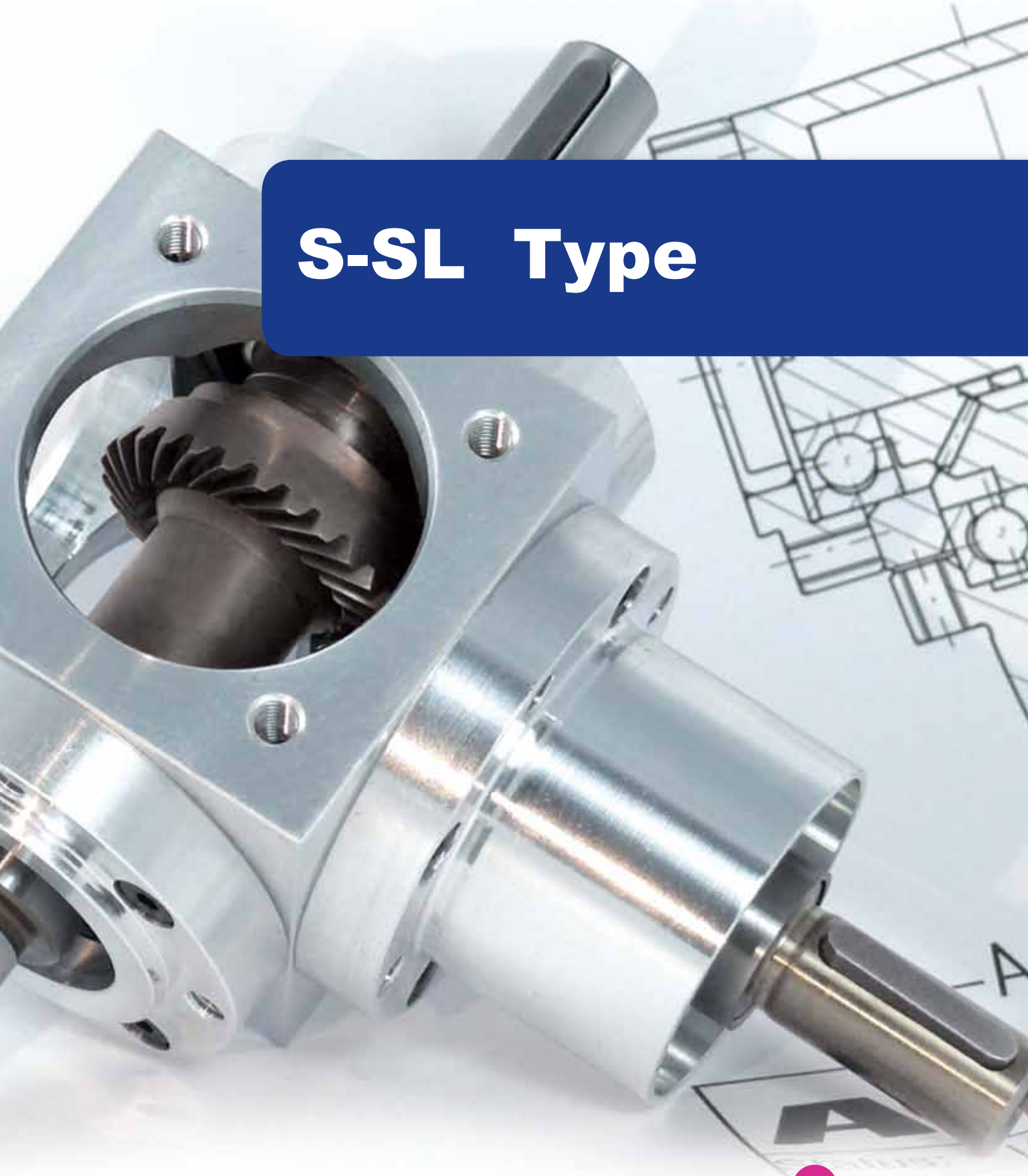
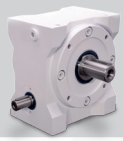
Produktkatalog | *Product-Catalogue*

S-SL Type



ATEK
ANTRIEBSTECHNIK



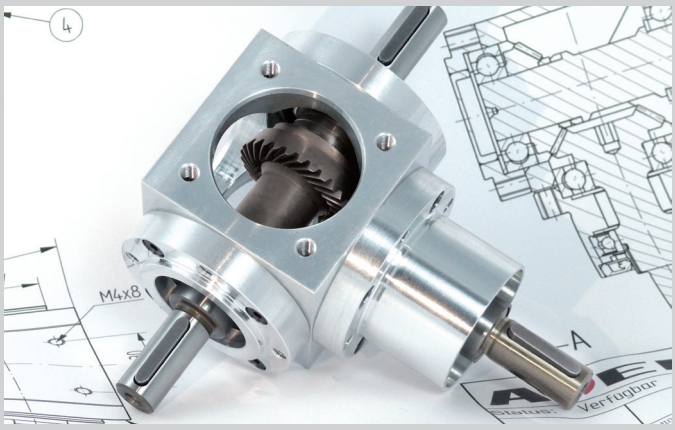
Worm gearboxes

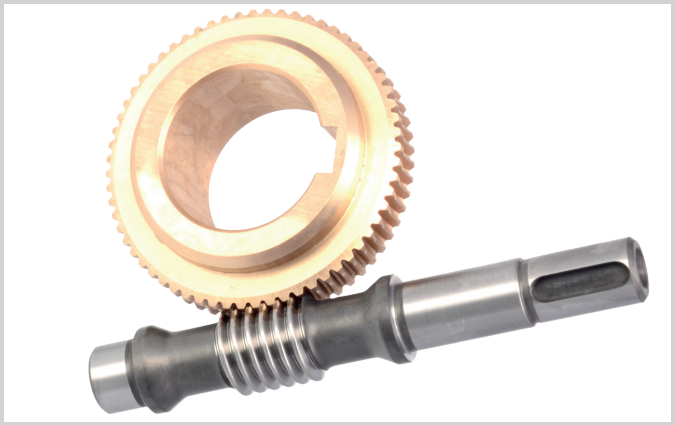
Nominal gear ratios: i = 5:1 to 83:1
Maximum output torque: 13,720 Nm
9 sizes, centre-to-centre distance of 040 to 250 mm
Speeds up to n_1 = 3000 rpm
Low-backlash construction < 6 angular minutes possible

Sturdy, powerful, low-noise
Housing made of grey cast iron
Axial offset between drive and output
Maintenance-free

ATEK ANTRIEBSTECHNIK

2 Contents





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

ATEK Antriebstechnik

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

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

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

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

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

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

1939
Formation of Willi Glapiak turnery in Hamburg

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

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

1985
Focussing on single-stage bevel gearboxes and worm gearboxes

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

Drive
Our hallmark:
Excellent ability to supply

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

Fast and almost constant reachability

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

Our processes are subject to continuous monitoring

Our management system is certified

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

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

We stand for long-standing partnerships, loyalty and confidence

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

1997
Relocation to Prisdorf / Expansion of production capacities

Since 2002
Internationalisation / Development / extension of foreign markets

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

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

2013
Relocation to Rellingen with renewed expansion of production capacities

4 General

4.1 Gearboxes

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

Bevel gearboxes – types

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

Hypoid gearboxes – types

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

Worm gearboxes – types

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

4.2 Legal classification

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

4.3 Designations

4.3.1 Designations used

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

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

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

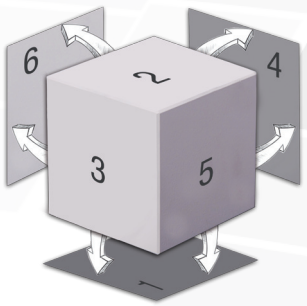


Figure **4.3.1-1; Gearbox sides**

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

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

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

Gear ratio

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

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

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

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

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

Efficiency

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

Rotational direction of the shaft

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

4.4 Corrosion protection

4.4.1 Prime-coated C1 (standard)

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

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

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

Table **4.4.1-1**

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

4.4.2 Varnished C2

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

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

Table **4.4.2-1**

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

4.4.3 Varnished C3

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

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

Table **4.4.3-1**

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

4.4.4 Varnished C4

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

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

Table **4.4.4-1**

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

4.4.5 Electroplated

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

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

Table **4.4.5-1**

4.4.6 Aluminium

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

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

Table **4.4.6-1**

4.4.7 Coated (anodised)

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

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

Table **4.4.7-1**

4.4.8 Stainless steel

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

4.5 Protection classes

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

Table **4.5-1**

Other protection classes are available on request.

4.6 Shaft types

4.6.1 Construction types

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

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

4.6.2 Solid shaft

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

4.6.3 Hollow shaft

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

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

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

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

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

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

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

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

4.7 Lubricants

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

4.8 Radial shaft seal rings

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

4.9 Gearbox data and layout

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

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

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

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

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

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

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

4.9.5 Abbreviations used

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

4.9.6 Layout

Calculation of power and torque

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

$P_1 = T_1 * n_1$

$n_1 = n_2 * i$

$P_2 = T_2 * n_2$

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

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

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

Formula 1

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

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

Formula 2

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

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

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

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

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

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

Operating factor f_1

Determination of load group f_{MB}

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

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

Table **4.9.6-1**

Determination of operating factor f_1

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

Table **4.9.6-2**

Starting factor f_2

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

Table **4.9.6-3**

Lubrication factor f_3

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

Table **4.9.6-4**

Temperature factor f_4

The factor f_4 considers the influence of the ambient temperature

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

Table **4.9.6-5**

Operating mode / duty-cycle factor f_5

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

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

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

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

Table **4.9.6-6**

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

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

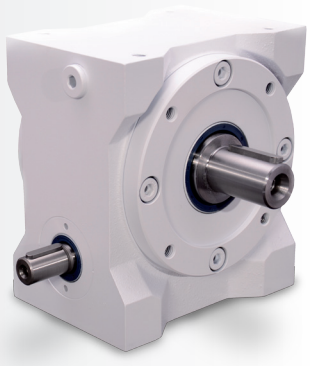
Table **4.9.6-7**

4.10 Maintenance and starting-up

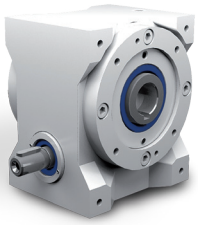
For information on starting-up and maintenance, please refer to the operating instructions. They can be found on the Internet by accessing www.atek.de/download. There you can also find information on the Machinery Directive 2006/42 EC.

4.11 Ordering

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

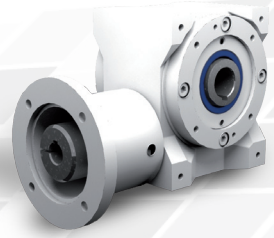


9.1 Type overview



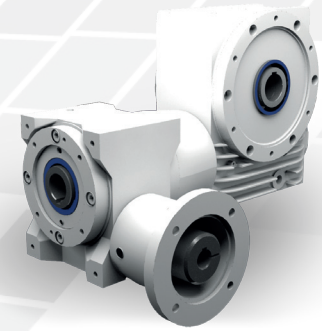
Type S – Standard worm gearboxes

Gear ratios: i = 05:1 to 83:1
Maximum output torque: 13720 Nm
9 sizes, centre-to-centre distance of 040 to 250 mm
Low-backlash construction < 6 angular minutes possible
Housing made of grey cast iron



Type SL – Type S with flange for motor mounting

Gear ratios: i = 05:1 to 83:1
Maximum output torque: 13720 Nm
9 sizes, centre-to-centre distance of 040 to 250 mm
Low-backlash construction < 6 angular minutes possible
Suitable for fitting IEC standard motors
Drive side with hollow-bored shaft and flange
Housing made of grey cast iron



Double worm gear unit

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

9.2 General construction

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

9.2.1 Toothing

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

9.2.2 Construction types

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

9.2.3 Threaded mounting holes

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

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

Table **9.2.3-1**

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

9.2.4 Installation position

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

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

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

9.2.5 Shaft designation – allocation to the gearbox sides

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

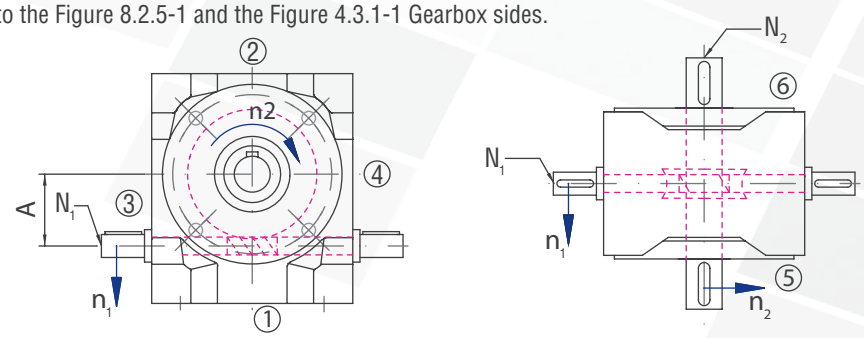


Figure **9.2.5-1**

9.2.6 Rotational direction and gear ratio

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

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

9.2.7 Efficiency

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

Starting efficiency

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

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

Table **9.2.7-1**

Operating efficiency

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

Step-up drive

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

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

Self-locking

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

9.2.8 Lubrication

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

/A1 means:

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

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

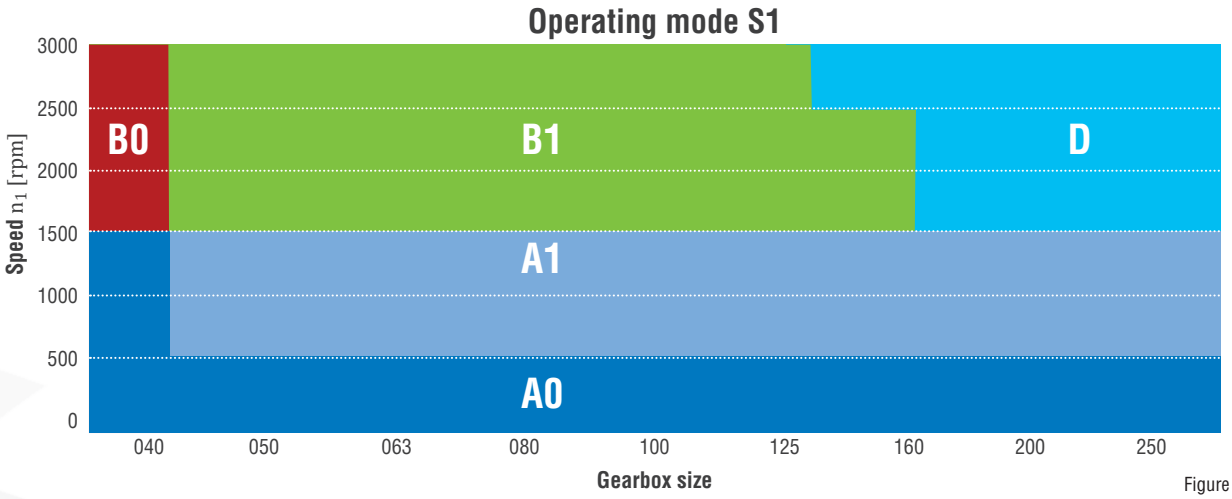


Figure **9.2.8-1**

Oil viscosity table

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

Table **9.2.8-1**

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

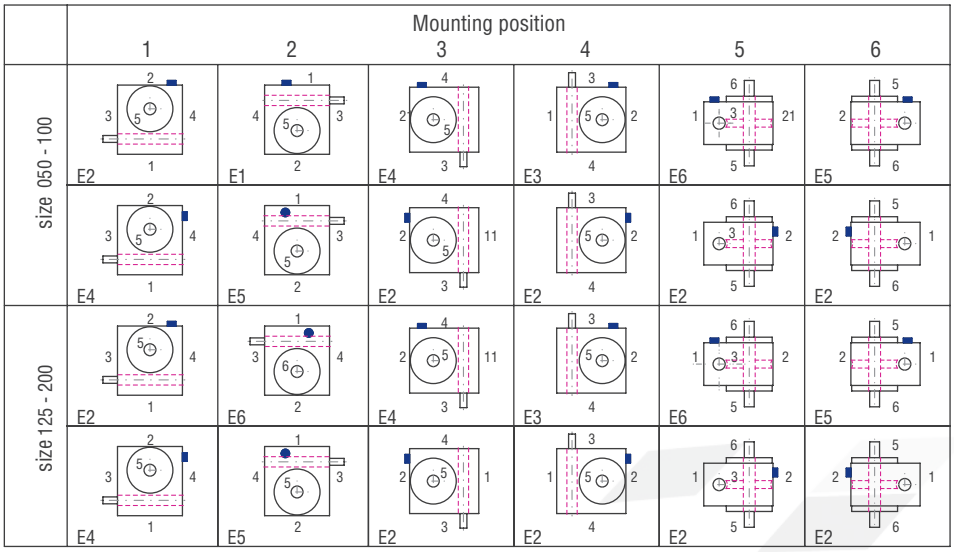
Code; numeral 2	Vent filter
0	No
1	Yes

Table **9.2.8-2**

9.2.9 Vent filter

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

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



Straight standard filter

Figure **8.2.9-1; Installation positions**

9.2.10 Low-backlash construction

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

Circumferential backlash, measuring method

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

Circumferential backlash, type

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

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

Table **8.2.10-1**

Abbreviation: u.r. – upon request

9.2.11 Self-locking

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

Static self-locking

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

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

Dynamic self-locking

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

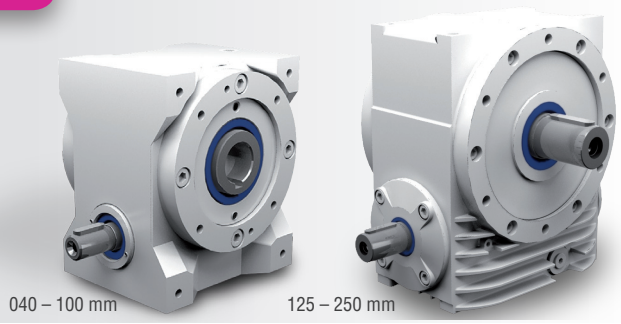
Limits

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

9.3 Type S – Standard worm gearboxes

9.3.1 Features

Nominal gear ratios: i = 05:1 to 83:1
Maximum output torque: 13,720 Nm
8 sizes, centre-to-centre distance of 040 to 250 mm
Low-backlash construction < 6 angular minutes possible
Housing made of grey cast iron



040 – 100 mm 125 – 250 mm

9.3.2 Models

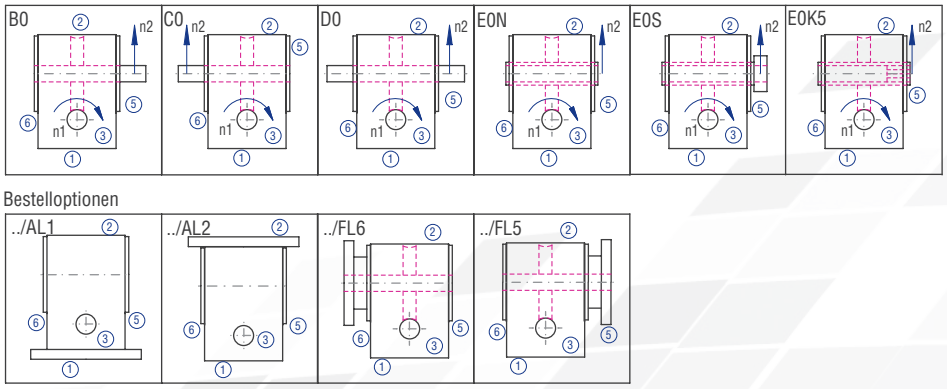


Figure **9.3.2-1; Models**

9.3.3 Gearbox sides

The example shows the Model B0

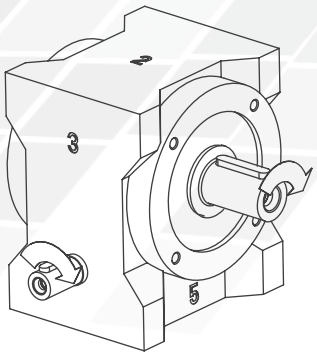


Figure **9.3.3-1; Gearbox sides**

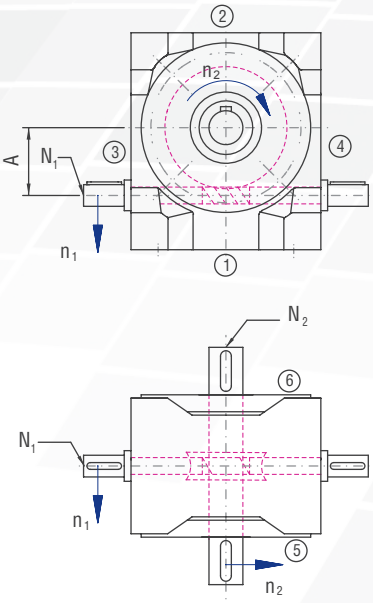


Figure **9.3.3-2; Shaft designations**

9.3.4 Order code

The order code reflects the customer specifications. Example:

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

Table **9.3.4-1**

9.3.5 Overview of performance data

Größe	n_1 [1/min]	5:1					7,5:1					10:1					13:1				
		n_2 [1/min]	P_{1N} [kW]	T_{2N} [Nm]	P_{1NT} [kW]	η	n_2 [1/min]	P_{1N} [kW]	T_{2N} [Nm]	P_{1NT} [kW]	η	n_2 [1/min]	P_{1N} [kW]	T_{2N} [Nm]	P_{1NT} [kW]	η	n_2 [1/min]	P_{1N} [kW]	T_{2N} [Nm]	P_{1NT} [kW]	η
040	3000	600,0	2,26	33	1,85	0,94	400,0	1,68	36	1,45	0,92	300,0	1,39	39	1,28	0,91	230,0	0,85	31	1,13	0,88
	1500	300,0	1,43	41	1,25	0,94	200,0	1,06	45	0,95	0,91	150,0	0,77	43	0,83	0,90	115,0	0,45	32	0,75	0,87
	1000	200,0	1,09	47	1,10	0,93	133,0	0,81	51	0,77	0,90	100,0	0,55	45	0,69	0,88	76,0	0,32	34	0,63	0,85
	750	150,0	0,87	49	0,90	0,87	100,0	0,65	54	0,70	0,89	75,0	0,43	47	0,63	0,87	57,0	0,26	36	0,57	0,84
	500	100,0	0,64	53	0,80	0,90	66,0	0,48	58	0,61	0,87	50,0	0,32	50	0,87	0,85	38,0	0,19	39	0,52	0,83
	150	30,0	0,25	67	0,00	0,86	20,0	0,19	73	0,00	0,82	15,0	0,13	64	0,00	0,81	11,0	0,08	50	0,00	0,80
050	3000	600,0	4,74	70	3,90	0,96	400,0	3,41	74	3,16	0,94	300,0	3,02	85	2,82	0,93	230,0	1,51	55	2,51	0,90
	1500	300,0	3,29	96	2,76	0,95	200,0	2,42	104	2,12	0,93	150,0	1,64	91	1,88	0,92	115,0	0,82	59	1,67	0,89
	1000	200,0	2,54	110	2,10	0,94	133,0	1,84	117	1,76	0,92	100,0	1,15	94	1,56	0,90	76,0	0,58	62	0,14	0,88
	750	150,0	2,08	119	2,04	0,93	100,0	1,43	120	1,57	0,91	75,0	0,96	103	1,40	0,89	57,0	0,45	64	1,27	0,87
	500	100,0	1,47	125	1,76	0,92	66,0	1,01	125	1,36	0,89	50,0	0,71	112	1,23	0,87	38,0	0,32	66	1,13	0,85
	150	30,0	0,54	145	0,00	0,88	20,0	0,40	153	0,00	0,83	15,0	0,26	130	0,00	0,82	11,0	0,12	75	0,00	0,80
063	3000	600,0	6,37	94	5,80	0,96	400,0	4,89	106	4,63	0,94	300,0	4,15	121	4,16	0,94	230,0	3,31	125	3,68	0,93
	1500	300,0	4,96	145	4,25	0,95	200,0	3,62	157	3,26	0,94	150,0	2,94	170	2,89	0,93	115,0	1,81	135	2,53	0,92
	1000	200,0	3,77	165	3,56	0,95	133,0	2,78	179	2,72	0,93	100,0	2,26	194	2,41	0,92	76,0	1,29	141	2,12	0,90
	750	150,0	3,11	180	3,15	0,94	100,0	2,37	201	2,41	0,92	75,0	1,83	207	2,15	0,91	57,0	1,00	145	1,90	0,89
	500	100,0	2,31	198	2,67	0,93	66,0	1,79	223	2,06	0,90	50,0	1,30	216	1,86	0,89	38,0	0,71	151	1,66	0,87
	150	30,0	0,91	247	0,00	0,88	20,0	0,72	280	0,00	0,84	15,0	0,51	265	0,00	0,83	11,0	0,26	170	0,00	0,82
080	3000	600,0	11,13	170	8,62	0,96	400,0	8,64	196	6,69	0,95	300,0	6,58	197	5,92	0,94	230,0	4,41	173	5,27	0,93
	1500	300,0	8,18	250	6,68	0,96	200,0	6,37	289	5,14	0,95	150,0	4,96	297	4,47	0,94	115,0	2,41	187	3,91	0,92
	1000	200,0	4,36	298	5,70	0,95	133,0	5,01	341	4,37	0,95	100,0	3,79	340	3,79	0,94	76,0	1,70	196	3,32	0,91
	750	150,0	5,55	332	5,05	0,94	100,0	4,36	391	3,88	0,94	75,0	3,15	373	3,36	0,93	57,0	1,33	202	2,96	0,90
	500	100,0	4,01	360	4,24	0,94	66,0	3,33	439	3,27	0,92	50,0	2,35	408	2,86	0,91	38,0	0,94	210	2,56	0,88
	150	30,0	1,58	448	0,00	0,89	20,0	1,39	569	0,00	0,86	15,0	0,96	513	0,00	0,84	11,0	0,34	236	0,00	0,83
100	3000	600,0	29,45	450	11,30	0,96	400,0	22,62	513	9,06	0,95	300,0	18,55	555	8,57	0,94	230,0	11,09	427	7,87	0,93
	1500	300,0	19,31	590	8,60	0,96	200,0	14,33	650	6,85	0,95	150,0	11,75	703	6,35	0,94	115,0	6,09	464	5,73	0,92
	1000	200,0	14,99	680	7,55	0,95	133,0	10,92	743	5,99	0,95	100,0	8,95	803	5,49	0,94	76,0	4,30	486	4,92	0,91
	750	150,0	12,45	745	6,87	0,94	100,0	9,10	817	5,43	0,94	75,0	7,45	882	4,95	0,93	57,0	3,37	502	4,43	0,90
	500	100,0	9,47	850	5,96	0,94	66,0	7,00	932	4,71	0,93	50,0	5,79	1006	4,30	0,91	38,0	2,37	523	3,85	0,89
	150	30,0	4,01	1150	0,00	0,90	20,0	3,03	1258	0,00	0,87	15,0	2,02	1095	0,00	0,85	11,0	0,85	586	0,00	0,83
125	3000	600,0	42,41	626	17,93	0,96	400,0	35,71	738	14,40	0,95	300,0	28,41	850	13,62	0,94	230,0	18,19	700	12,83	0,93
	1500	300,0	30,32	895	14,48	0,96	200,0	22,49	986	11,53	0,95	150,0	17,86	1069	10,68	0,94	115,0	10,02	763	9,84	0,92
	1000	200,0	23,15	1025	13,01	0,96	133,0	17,13	1127	10,31	0,95	100,0	13,61	1222	9,41	0,94	76,0	7,00	800	8,56	0,92
	750	150,0	19,34	1130	11,94	0,95	100,0	14,13	1239	9,44	0,95	75,0	11,22	1343	8,54	0,94	57,0	5,42	826	7,72	0,92
	500	100,0	14,72	1290	10,40	0,95	66,0	11,03	1436	8,20	0,94	50,0	8,62	1532	7,37	0,93	38,0	3,86	862	6,65	0,90
	150	30,0	6,29	1760	0,00	0,91	20,0	4,96	2016	0,00	0,88	15,0	3,78	2092	0,00	0,87	11,0	1,37	966	0,00	0,85
160	3000						400,0	43,91	996	23,14	0,95	300,0	51,25	1550	22,09	0,95	230,0	36,29	1466	20,77	0,94
	1500	300,0	53,11	1640	25,20	0,97	200,0	39,53	1793	20,07	0,95	150,0	32,26	1951	18,76	0,95	115,0	19,80	1600	17,24	0,94
	1000	200,0	40,37	1870	23,42	0,97	133,0	29,83	2051	18,56	0,96	100,0	24,59	2231	17,04	0,95	76,0	13,87	1681	15,41	0,94
	750	150,0	33,38	2040	21,89	0,96	100,0	24,94	2263	17,28	0,95	75,0	20,28	2453	15,66	0,95	57,0	10,87	1738	14,02	0,93
	500	100,0	24,58	2230	19,33	0,95	66,0	20,05	2729	15,18	0,95	50,0	15,60	2800	13,57	0,94	38,0	7,66	1810	12,06	0,92
	150	30,0	9,96	2950	0,00	0,93	20,0	9,34	4013	0,00	0,90	15,0	6,98	3909	0,00	0,88	11,0	2,73	2041	0,00	0,87
200	3000																230,0	64,74	2594	31,35	0,95
	1500	300,0	84,20	260	41,80	0,97	200,0	62,59	2869	33,51	0,96	150,0	50,86	3076	30,91	0,95	115,0	40,74	3265	28,70	0,95
	1000	200,0	64,77	3000	40,25	0,97	133,0	50,68	3485	32,09	0,96	100,0	38,38	3519	29,22	0,96	76,0	31,06	3734	26,62	0,95
	750	150,0	55,30	3380	38,36	0,96	100,0	44,55	4084	30,44	0,96	75,0	32,92	4024	27,42	0,96	57,0	24,46	3921	24,63	0,95
	500	100,0	41,45	3800	34,49	0,96	66,0	36,26	4987	27,20	0,96	50,0	26,73	4851	24,16	0,95	38,0	17,27	4109	21,36	0,94
	150	30,0	18,05	5400	0,00	0,94	20,0	17,32	7607	0,00	0,92	15,0	12,45	7134	0,00	0,90	11,0	6,24	4633	0,00	0,88
250	1500						200,0	140,64	6514	78,13	0,97	150,0	118,29	7230	73,93	0,96	115,0	93,66	7585	66,90	0,96
	1000						133,0	111,12	7720	69,45	0,97	100,0	89,06	8165	68,51	0,96	76,0	69,15	8400	62,86	0,96
	750						100,0	90,87	8418	60,58	0,97	75,0	72,81	8900	60,67	0,96	57,0	53,77	8709	53,77	0,96
	500						66,0	68,37	9500	52,59	0,97	50,0	54,79	10047	49,81	0,96	38,0	38,02	9140	47,52	0,95
	150						20,0	29,86	13260	0,00	0,93	15,0	54,79	10047	0,00	0,96	11,0	13,65	10360	0,00	0,90

Table **9.3.5-1**

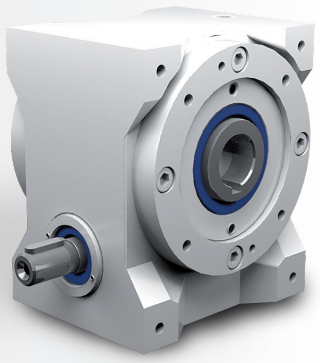
Größe	n_1 [1/min]	15:1					20:1					26:1					30:1				
		n_2 [1/min]	P_{1N} [kW]	T_{2N} [Nm]	P_{1NT} [kW]	η	n_2 [1/min]	P_{1N} [kW]	T_{2N} [Nm]	P_{1NT} [kW]	η	n_2 [1/min]	P_{1N} [kW]	T_{2N} [Nm]	P_{1NT} [kW]	η	n_2 [1/min]	P_{1N} [kW]	T_{2N} [Nm]	P_{1NT} [kW]	η
040	3000	200,0	0,93	37	0,85	0,86	150,0	0,82	43	0,77	0,84	115,0	0,55	36	0,68	0,80	100,0	0,53	36	0,51	0,75
	1500	100,0	0,60	48	0,55	0,84	75,0	0,49	50	0,49	0,82	57,0	0,30	38	0,44	0,78	50,0	0,37	50	0,33	0,73
	1000	66,0	0,48	55	0,46	0,82	50,0	0,36	53	0,42	0,80	38,0	0,21	40	0,38	0,76	33,0	0,29	57	0,28	0,70
	750	50,0	0,39	58	0,41	0,81	37,0	0,28	55	0,38	0,78	28,0	0,17	42	0,34	0,75	25,0	0,24	60	0,26	0,68
	500	33,0	0,29	63	0,36	0,78	25,0	0,21	58	0,34	0,76	19,0	0,12	45	0,31	0,73	16,0	0,18	65	0,23	0,64
	150	10,0	0,12	79	0,00	0,72	7,5	0,09	75	0,00	0,71	5,8	0,05	59	0,00	0,69	5,0	0,08	82	0,00	0,57
050	3000	200,0	1,82	74	1,91	0,88	150,0	1,54	81	1,70	0,87	115,0	1,04	71	1,51	0,84	100,0	1,12	82	1,14	0,79
	1500	100,0	1,32	106	1,27	0,87	75,0	1,03	106	1,12	0,85	57,0	0,58	76	1,00	0,81	50,0	0,79	113	0,76	0,77
	1000	66,0	1,02	120	1,05	0,85	50,0	0,73	110	0,93	0,83	38,0	0,42	80	0,84	0,79	33,0	0,59	121	0,63	0,74
	750	50,0	0,84	131	0,94	0,84	37,0	0,63	123	0,84	0,81	28,0	0,32	82	0,76	0,78	25,0	0,54	144	0,06	0,72
	500	33,0	0,65	145	0,82	0,81	25,0	0,47	133	0,74	0,78	19,0	0,24	86	0,68	0,75	16,0	0,42	157	0,50	0,68
	150	10,0	0,26	179	0,00	0,74	7,5	0,18	158	0,00	0,72	5,8	0,09	98	0,00	0,70	5,0	0,18	201	0,00	0,59
063	3000	200,0	3,12	128	2,80	0,89	150,0	2,95	161	2,52	0,88	115,0	1,89	132	2,21	0,86	100,0	1,94	143	1,66	0,80
	1500	100,0	2,23	183	1,95	0,00	75,0	1,70	186	1,73	0,88	57,0	1,25	173	1,52	0,85	50,0	1,38	204	1,15	0,80
	1000	66,0	1,77	213	1,62	0,00	50,0	1,32	212	1,44	0,86	38,0	0,90	181	1,27	0,83	33,0	1,11	237	0,97	0,77
	750	50,0	1,51	240	1,44	0,86	37,0	1,14	237	1,29	0,84	28,0	0,71	187	1,14	0,81	25,0	0,97	268	0,86	0,75
	500	33,0	1,16	266	1,23	0,83	25,0	0,86	259	1,12	0,81	19,0	0,51	195	1,01	0,78	16,0	0,75	296	0,75	0,71
	150	10,0	0,48	333	0,00	0,75	7,5	0,34	310	0,00	0,74	5,8	0,19	222	0,00	0,71	5,0	0,36	403	0,00	0,61
080	3000	200,0	5,61	241	4,08	0,90	150,0	4,24	240	3,59	0,89	115,0	2,83	210	3,19	0,88	100,0	3,47	272	2,41	0,82
	1500	100,0	4,10	352	3,09	0,90	75,0	3,04	344	2,67	0,89	57,0	1,67	245	2,34	0,87	50,0	2,52	395	1,81	0,82
	1000	66,0	3,26	415	2,62	0,89	50,0	2,37	399	2,26	0,88	38,0	1,19	256	1,99	0,85	33,0	2,03	456	1,54	0,80
	750	50,0	2,81	473	2,32	0,88	37,0	2,05	450	2,01	0,86	28,0	0,94	264	1,78	0,83	25,0	1,78	530	1,38	0,78
	500	33,0	2,18	530	1,97	0,85	25,0	1,57	498	1,72	0,83	19,0	0,68	275	1,55	0,80	16,0	1,38	593	1,18	0,75
	150	10,0	0,93	681	0,00	0,77	7,5	0,64	615	0,00	0,75	5,8	0,25	312	0,00	0,73	5,0	0,63	760	0,00	0,63
100	3000	200,0	13,12	564	5,76	0,90	150,0	10,84	614	5,44	0,89	115,0	7,63	556	4,94	0,88	100,0	7,53	590	3,50	0,82
	1500	100,0	8,32	715	4,31	0,90	75,0	6,87	778	3,99	0,89	57,0	4,20	605	3,57	0,87	50,0	4,78	748	2,60	0,82
	1000	66,0	6,41	817	3,75	0,89	50,0	5,28	888	3,44	0,88	38,0	3,00	634	3,06	0,85	33,0	3,60	825	2,27	0,80
	750	50,0	5,34	898	3,40	0,88	37,0	4,45	975	3,10	0,86	28,0	2,38	655	2,75	0,83	25,0	3,19	950	2,06	0,78
	500	33,0	4,16	1025	2,95	0,86	25,0	3,47	1112	2,69	0,84	19,0	1,72	683	2,40	0,80	16,0	2,51	1080	1,81	0,75
	150	10,0	1,88	1386	0,00	0,77	7,5	1,49	1441	0,00	0,76	5,8	0,64	773	0,00	0,73	5,0	1,18	1437	0,00	0,64
125	3000	200,0	20,06	862	9,13	0,90	150,0	16,59	940	8,61	0,89	115,0	12,76	929	8,09	0,88	100,0	11,76	901	5,50	0,83
	1500	100,0	12,61	1084	7,24	0,90	75,0	10,44	1183	6,68	0,89	57,0	7,03	1012	6,14	0,87	50,0	7,49	1134	4,31	0,82
	1000	66,0	10,01	1290	6,44	0,90	50,0	7,95	1352	5,86	0,89	38,0	4,97	1062	5,32	0,86	33,0	6,38	1448	3,83	0,82
	750	50,0	8,88	1510	5,88	0,89	37,0	6,74	1510	5,31	0,88	28,0	3,90	1097	4,80	0,85	25,0	5,65	1690	3,51	0,81
	500	33,0	6,91	1743	5,10	0,88	25,0	5,23	1717	4,58	0,86	19,0	2,78	1146	4,14	0,83	16,0	4,52	1952	3,08	0,78
	150	10,0	3,21	2423	0,00	0,79	7,5	2,33	2310	0,00	0,78	5,8	1,04	1294	0,00	0,75	5,0	1,86	2270	0,00	0,66
160	3000	200,0	29,82	1310	14,64	0,92	150,0	29,60	1715	13,95	0,91	115,0	23,70	1813	13,07	0,89	100,0	20,44	1640	8,79	0,84
	1500	100,0	22,42	1970	12,55	0,92	75,0	18,83	2158	11,70	0,90	57,0	13,88	2124	10,71	0,89	50,0	13,53	2170	7,39	0,84
	1000	66,0	18,10	2386	11,55	0,92	50,0	14,35	2467	10,58	0,90	38,0	9,83	2231	9,53	0,88	33,0	11,13	2678	6,79	0,84
	750	50,0	16,22	2820	10,73	0,91	37,0	12,43	2850	9,70	0,90	28,0	7,63	2307	8,66	0,88	25,0	9,85	3160	6,31	0,84
	500	33,0	12,88	3320	9,40	0,90	25,0	9,80	3294	8,39	0,88	19,0	5,44	2413	7,45	0,86	16,0	8,02	3720	5,57	0,81
	150	10,0	6,17	4830	0,00	0,82	7,5	4,49	4576	0,00	0,80	5,8	2,06	2727	0,00	0,77	5,0	3,41	4500	0,00	0,69
200	3000	100,0	39,27	3450	20,99	0,92	75,0	29,60	3430	19,21	0,91	57,0	23,79	3612	17,77	0,90	50,0	23,74	3900	12,29	0,86
	1500	66,0	32,34	4308	20,00	0,93	50,0	24,14	4241	18,07	0,92	38,0	18,40	4190	16,41	0,90	33,0	19,73	4862	11,65	0,86
	1000	50,0	28,88	5130	18,92	0,93	37,0	21,62	5010	16,92	0,91	28,0	14,95	4540	15,15	0,90	25,0	17,62	5790	11,03	0,86
	750	33,0	23,23	6122	16,85	0,92	25,0	17,17	5902	14,86	0,90	19,0	11,51	5184	13,12	0,89	16,0	14,33	6896	9,86	0,84
	500	10,0	11,50	9244	0,00	0,84	7,5	8,22	8587	0,00	0,82	5,8	4,58	6177	0,00	0,80	5,0	7,43	10356	0,00	0,73
	150	30,0	18,05	5400	0,00	0,94	20,0	17,32	7607	0,00	0,92	15,0	12,45	7134	0,00	0,90	11,0	6,24	4633	0,00	0,88
250	1500	100,0	74,97	6730	41,65	0,94	75,0	62,89	7447	41,92	0,93	57,0	50,28	7805	36,68	0,92	50,0	40,69	6840	20,35	0,88
	1000	66,0	59,15	7965	36,97	0,94	50,0	47,35	8410	36,42	0,93	38,0	37,84	8810	34,40	0,92	33,0	31,89	8040	19,93	0,88
	750	50,0	48,35	8680	32,23	0,94	37,0	38,71	9168	29,78	0,93	28,0	30,92	9600	30,92	0,92	25,0	26,06	8760	16,29	0,88
	500	33,0	36,78	9800	26,27	0,93	25,0	29,46	10352	26,78	0,92	19,0	23,54	10844	29,43	0,91	16,0	19,84	9891	14,17	0,87
	150	10,0	15,39	12790	0,00	0,87	7,5	12,68	13720	0,00	0,85	5,8	9,92	13720	0,00	0,82	5,0	8,65	12727	0,00	0,77

Table **9.3.5-1**

Größe	n_1 [1/min]	40:1					53:1					62:1					83:1				
		n_2 [1/min]	P_{1N} [kW]	T_{2N} [Nm]	P_{1NT} [kW]	η	n_2 [1/min]	P_{1N} [kW]	T_{2N} [Nm]	P_{1NT} [kW]	η	n_2 [1/min]	P_{1N} [kW]	T_{2N} [Nm]	P_{1NT} [kW]	η	n_2 [1/min]	P_{1N} [kW]	T_{2N} [Nm]	P_{1NT} [kW]	η
040	3000	75,0	0,48	44	0,46	0,72	57,0	0,39	44	0,42	0,68	48,0	0,36	45	0,35	0,63	36,0	0,25	36	0,32	0,56
	1500	37,0	0,32	56	0,30	0,70	28,0	0,21	46	0,28	0,65	24,0	0,20	48	0,23	0,59	18,0	0,14	37	0,21	0,52
	1000	25,0	0,25	63	0,25	0,67	18,0	0,15	48	0,24	0,63	16,0	0,15	51	0,20	0,56	12,0	0,10	38	0,18	0,50
	750	18,0	0,20	66	0,23	0,65	14,0	0,13	51	0,22	0,61	12,0	0,12	53	0,18	0,54	9,0	0,08	38	0,17	0,48
	500	12,0	0,15	71	0,21	0,62	9,4	0,09	55	0,20	0,59	8,1	0,09	56	0,16	0,51	6,0	0,05	38	0,15	0,46
	150	3,8	0,07	91	0,00	0,56	2,8	0,04	72	0,00	0,55	2,4	0,03	57	0,00	0,45	1,8	0,02	38	0,00	0,42
050	3000	75,0	0,87	80	1,02	0,76	57,0	0,65	77	0,92	0,73	48,0	0,61	81	0,75	0,67	36,0	0,39	59	0,70	0,58
	1500	37,0	0,65	118	0,68	0,75	28,0	0,38	85	0,62	0,69	24,0	0,42	105	0,50	0,64	18,0	0,21	63	0,47	0,56
	1000	25,0	0,52	134	0,57	0,71	18,0	0,27	88	0,52	0,67	16,0	0,31	109	0,43	0,60	12,0	0,15	64	0,41	0,54
	750	18,0	0,41	137	0,52	0,69	14,0	0,22	91	0,48	0,64	12,0	0,25	112	0,39	0,57	9,0	0,12	66	0,37	0,52
	500	12,0	0,31	147	0,46	0,65	9,4	0,16	95	0,43	0,61	8,1	0,18	113	0,36	0,53	6,0	0,09	69	0,34	0,49
	150	3,8	0,13	183	0,00	0,57	2,8	0,06	110	0,00	0,55	2,4	0,06	113	0,00	0,45	1,8	0,03	75	0,00	0,44
063	3000	75,0	1,54	149	1,50	0,78	57,0	1,16	143	1,34	0,76	48,0	0,82	110	1,10	0,69	36,0	0,75	129	0,99	0,66
	1500	37,0	1,08	207	1,04	0,77	28,0	0,80	191	0,96	0,74	24,0	0,66	175	0,76	0,68	18,0	0,46	152	0,69	0,63
	1000	25,0	0,85	237	0,87	0,75	18,0	0,58	200	0,78	0,71	16,0	0,53	202	0,65	0,65	12,0	0,33	152	0,59	0,59
	750	18,0	0,74	264	0,78	0,72	14,0	0,47	207	0,71	0,68	12,0	0,46	221	0,59	0,62	9,0	0,26	152	0,54	0,56
	500	12,0	0,57	288	0,69	0,68	9,4	0,34	217	0,63	0,65	8,1	0,34	226	0,52	0,57	6,0	0,19	152	0,49	0,52
	150	3,8	0,24	348	0,00	0,59	2,8	0,14	248	0,00	0,56	2,4	0,12	226	0,00	0,47	1,8	0,07	152	0,00	0,44
080	3000	75,0	2,62	267	2,14	0,80	57,0	1,78	234	1,93	0,78	48,0	1,40	194	1,55	0,70	36,0	1,10	196	1,43	0,68
	1500	37,0	1,87	381	1,58	0,80	28,0	1,04	271	1,41	0,77	24,0	1,01	279	1,15	0,70	18,0	0,90	304	1,04	0,65
	1000	25,0	1,49	443	1,35	0,78	18,0	0,76	284	1,20	0,74	16,0	0,81	325	0,98	0,68	12,0	0,64	304	0,90	0,61
	750	18,0	1,31	501	1,21	0,75	14,0	0,61	294	1,09	0,71	12,0	0,69	352	0,89	0,65	9,0	0,49	304	0,82	0,59
	500	12,0	1,02	553	1,05	0,71	9,4	0,45	308	0,96	0,68	8,1	0,54	393	0,78	0,61	6,0	0,35	304	0,73	0,55
	150	3,8	0,40	625	0,00	0,61	2,8	0,18	352	0,00	0,58	2,4	0,23	448	0,00	0,49	1,8	0,13	304	0,00	0,46
100	3000	75,0	6,33	645	3,32	0,80	57,0	4,76	615	3,04	0,78	48,0	4,59	645	2,39	0,70	36,0	3,33	591	2,24	0,68
	1500	37,0	4,01	817	2,42	0,80	28,0	2,63	670	2,19	0,77	24,0	2,91	817	1,74	0,70	18,0	1,74	599	1,61	0,66
	1000	25,0	3,13	933	2,09	0,78	18,0	1,92	704	1,88	0,74	16,0	2,17	886	1,52	0,68	12,0	1,23	599	1,40	0,62
	750	18,0	2,65	1025	1,90	0,76	14,0	1,53	728	1,71	0,72	12,0	1,70	886	1,39	0,65	9,0	0,94	599	1,28	0,61
	500	12,0	2,13	1169	1,67	0,72	9,4	1,11	762	1,51	0,69	8,1	1,21	886	1,24	0,61	6,0	0,67	599	1,15	0,57
	150	3,8	1,00	1581	0,00	0,62	2,8	0,45	870	0,00	0,59	2,4	0,44	886	0,00	0,50	1,8	0,24	599	0,00	0,47
125	3000	75,0	9,57	987	5,22	0,81	57,0	7,93	1037	4,93	0,79	48,0	6,86	988	3,75	0,73	36,0	5,72	1043	3,55	0,69
	1500	37,0	6,10	1242	4,00	0,80	28,0	4,44	1132	3,71	0,77	24,0	4,37	1243	2,86	0,72	18,0	3,30	1167	2,66	0,67
	1000	25,0	4,81	1470	3,52	0,80	18,0	3,15	1189	3,23	0,76	16,0	3,38	1421	2,52	0,71	12,0	2,23	1167	2,33	0,66
	750	18,0	4,25	1690	3,20	0,78	14,0	2,48	1230	2,93	0,75	12,0	2,87	1562	2,32	0,69	9,0	1,73	1167	2,13	0,64
	500	12,0	3,35	1922	2,79	0,75	9,4	1,83	1289	2,56	0,71	8,1	2,25	1731	2,05	0,65	6,0	1,23	1167	1,89	0,60
	150	3,8	1,42	2310	0,00	0,64	2,8	0,73	1470	0,00	0,61	2,4	0,84	1731	0,00	0,52	1,8	0,46	1167	0,00	0,48
160	3000	75,0	17,04	1801	8,41	0,83	57,0	13,62	1896	7,93	0,81	48,0	11,97	1800	6,00	0,75	36,0	9,76	1906	5,72	0,73
	1500	37,0	10,73	2267	6,92	0,83	28,0	8,52	2372	6,39	0,81	24,0	7,53	2266	4,87	0,75	18,0	6,10	2347	4,55	0,72
	1000	25,0	8,73	2735	6,25	0,82	18,0	6,05	2494	5,69	0,80	16,0	5,82	2591	4,42	0,74	12,0	4,18	2347	4,07	0,70
	750	18,0	7,73	3190	5,76	0,81	14,0	4,81	2582	5,19	0,78	12,0	4,86	2848	4,09	0,73	9,0	3,18	2347	3,74	0,69
	500	12,0	6,11	3688	5,02	0,79	9,4	3,50	2708	4,52	0,75	8,1	3,83	3225	3,63	0,70	6,0	2,25	2347	3,31	0,65
	150	3,8	2,90	4952	0,00	0,67	2,8	1,40	3091	0,00	0,64	2,4	1,61	3552	0,00	0,55	1,8	0,74	2347	0,00	0,59
200	3000	75,0	23,93	2560	12,58	0,84	57,0	21,71	3003	11,96	0,82	48,0	18,60	2835	8,90	0,76	36,0	15,43	3016	8,61	0,74
	1500	37,0	18,04	3860	11,27	0,84	28,0	13,99	3870	10,48	0,82	24,0	11,56	3569	7,77	0,77	18,0	9,58	3797	7,38	0,75
	1000	25,0	14,66	4761	10,56	0,85	18,0	11,19	4701	9,65	0,83	16,0	8,81	4081	7,28	0,77	12,0	7,31	4343	6,80	0,75
	750	18,0	13,14	5620	9,89	0,84	14,0	9,40	5200	8,93	0,82	12,0	7,36	4488	6,85	0,76	9,0	6,06	4675	6,34	0,73
	500	12,0	10,56	6613	8,75	0,82	9,4	6,79	5428	7,81	0,79	8,1	5,84	5128	6,14	0,73	6,0	4,21	4675	5,62	0,70
	150	3,8	5,58	9942	0,00	0,70	2,8	3,09	6985	0,00	0,67	2,4	2,99	6946	0,00	0,58	1,8	1,61	4675	0,00	0,55
250	1500	37,0	33,90	7510	24,21	0,87	28,0	27,44	7870	18,29	0,85	24,0	21,87	6819	14,58	0,79	18,0	18,60	7765	14,31	0,79
	1000	25,0	25,52	8480	23,20	0,87	18,0	20,64	8881	15,88	0,85	16,0	17,23	8060	13,25	0,79	12,0	14,18	8770	14,18	0,78
	750	18,0	20,87	9250	18,98	0,87	14,0	16,88	9685	16,88	0,85	12,0	14,09	8787	14,09	0,79	9,0	11,25	9155	11,25	0,77
	500	12,0	16,08	10445	17,87	0,85	9,4	13,01	10935	13,01	0,83	8,1	10,88	9918	10,88	0,77	6,0	7,80	9155	9,75	0,74
	150	3,8	7,29	13720	0,00	0,74	2,8	5,81	13720	0,00	0,70	2,4	5,14	12581	0,00	0,62	1,8	2,94	9155	0,00	0,59

Table **9.3.5-1**

9.3.6 Type S 040 – Standard worm gearboxes



Characteristics

Characteristic	Standard	Option
Toothing	Hardened and ground worm shaft / bronze worm gear	See chapter 9.2.1
Gear ratio	5:1 to 83:1	
Housing / Flanges	Grey cast iron	
Threaded mounting hole	On gearbox side 1 and on the flanges	See chapter 9.2.3
Shaft	Material 1 C45, shaft ends greased Fit with ISO j6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	Material 1 C45, shafts greased Fit with ISO H7 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.3
Radial shaft seal ring	NBR, form A	See chapter 4.8
Ambient temperature	- 10°C to +90°C. The values of the performance tables are valid for 20°C	See chapter 4.9.3
Circumferential backlash	< 30 arcmin	See chapter 9.2.10
Protection class	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness > 40 µm	See chapter 4.4
Bearing life L10h	more than 15,000h	See chapter 4.9.1
Oil change intervals	Not required if the oil temperature is kept < 90°C The lifetime of the bearings can be increased by the factor 1.5 if the oil is changed after the first 500 service hours and then every 5000 service hours.	See chapter 9.2.8
Lubricant	Synthetic lubricants	See chapter 9.2.8

Performance data

i	i ist		n_1 [rpm]					
			3000	1500	1000	750	500	150
5:1	29:6	n_2 [rpm]	600.0	300.0	200.0	150.0	100.0	30.0
		P_{1N} [kW]	2.26	1.43	1.09	0.87	0.64	0.25
		T_{2N} [Nm]	33	41	47	49	53	67
		P_{1NT} [kW]	1.85	1.25	1.10	0.90	0.80	0.00
		Efficiency	0.94	0.94	0.93	0.87	0.90	0.86
7.5:1	29:4	n_2 [rpm]	400.0	200.0	133.0	100.0	66.0	20.0
		P_{1N} [kW]	1.68	1.06	0.81	0.65	0.48	0.19
		T_{2N} [Nm]	36	45	51	54	58	73
		P_{1NT} [kW]	1.45	0.95	0.77	0.70	0.61	0.00
		Efficiency	0.92	0.91	0.90	0.89	0.87	0.82
10:1	39:4	n_2 [rpm]	300.0	150.0	100.0	75.0	50.0	15.0
		P_{1N} [kW]	1.39	0.77	0.55	0.43	0.32	0.13
		T_{2N} [Nm]	39	43	45	47	50	64
		P_{1NT} [kW]	1.28	0.83	0.69	0.63	0.87	0.00
		Efficiency	0.91	0.90	0.88	0.87	0.85	0.81
13:1	52:4	n_2 [rpm]	230.0	115.0	76.0	57.0	38.0	11.0
		P_{1N} [kW]	0.85	0.45	0.32	0.26	0.19	0.08
		T_{2N} [Nm]	31	32	34	36	39	50
		P_{1NT} [kW]	1.13	0.75	0.63	0.57	0.52	0.00
		Efficiency	0.88	0.87	0.85	0.84	0.83	0.80
15:1	29:2	n_2 [rpm]	200.0	100.0	66.0	50.0	33.0	10.0
		P_{1N} [kW]	0.93	0.60	0.48	0.39	0.29	0.12
		T_{2N} [Nm]	37	48	55	58	63	79
		P_{1NT} [kW]	0.85	0.55	0.46	0.41	0.36	0.00
		Efficiency	0.86	0.84	0.82	0.81	0.78	0.72
20:1	39:2	n_2 [rpm]	150.0	75.0	50.0	37.0	25.0	7.5
		P_{1N} [kW]	0.82	0.49	0.36	0.28	0.21	0.09
		T_{2N} [Nm]	43	50	53	55	58	75
		P_{1NT} [kW]	0.77	0.49	0.42	0.38	0.34	0.00
		Efficiency	0.84	0.82	0.80	0.78	0.76	0.71

i	i ist		n_1 [rpm]					
			3000	1500	1000	750	500	150
26:1	52:2	n_2 [rpm]	115.0	57.0	38.0	28.0	19.0	5.8
		P_{1N} [kW]	0.55	0.30	0.21	0.17	0.12	0.05
		T_{2N} [Nm]	36	38	40	42	45	59
		P_{1NT} [kW]	0.68	0.44	0.38	0.34	0.31	0.00
		Efficiency	0.80	0.78	0.76	0.75	0.73	0.69
30:1	29:1	n_2 [rpm]	100.0	50.0	33.0	25.0	16.0	5.0
		P_{1N} [kW]	0.53	0.37	0.29	0.24	0.18	0.08
		T_{2N} [Nm]	36	50	57	60	65	82
		P_{1NT} [kW]	0.51	0.33	0.28	0.26	0.23	0.00
		Efficiency	0.75	0.73	0.70	0.68	0.64	0.57
40:1	39:1	n_2 [rpm]	75.0	37.0	25.0	18.0	12.0	3.8
		P_{1N} [kW]	0.48	0.32	0.25	0.20	0.15	0.07
		T_{2N} [Nm]	44	56	63	66	71	91
		P_{1NT} [kW]	0.46	0.30	0.25	0.23	0.21	0.00
		Efficiency	0.72	0.70	0.67	0.65	0.62	0.56
53:1	52:1	n_2 [rpm]	57.0	28.0	18.0	14.0	9.4	2.8
		P_{1N} [kW]	0.39	0.21	0.15	0.13	0.09	0.04
		T_{2N} [Nm]	44	46	48	51	55	72
		P_{1NT} [kW]	0.42	0.28	0.24	0.22	0.20	0.00
		Efficiency	0.68	0.65	0.63	0.61	0.59	0.55
62:1	63:1	n_2 [rpm]	48.0	24.0	16.0	12.0	8.1	2.4
		P_{1N} [kW]	0.36	0.20	0.15	0.12	0.09	0.03
		T_{2N} [Nm]	45	48	51	53	56	57
		P_{1NT} [kW]	0.35	0.23	0.20	0.18	0.16	0.00
		Efficiency	0.63	0.59	0.56	0.54	0.51	0.45
83:1	82:1	n_2 [rpm]	36.0	18.0	12.0	9.0	6.0	1.8
		P_{1N} [kW]	0.25	0.14	0.10	0.08	0.05	0.02
		T_{2N} [Nm]	36	37	38	38	38	38
		P_{1NT} [kW]	0.32	0.21	0.18	0.17	0.15	0.00
		Efficiency	0.56	0.52	0.50	0.48	0.46	0.42

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

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

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

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

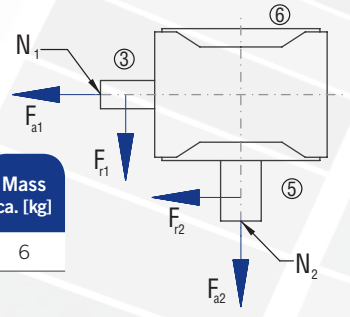
n_2 [rpm]	200		125		75		50		30		10	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 80	970	485	1250	625	1380	690	1600	800	1800	900	2500	1250

Inertia moments/mass

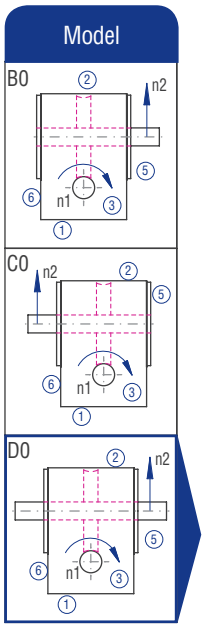
Inertia moment J_1 related to the fast-rotating shaft (N_1)

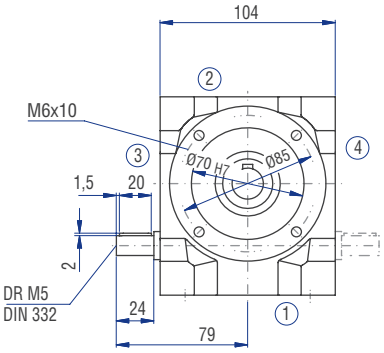
	Inertia moment [kgcm^2]											
	5:1	7.5:1	10:1	13:1	15:1	20:1	26:1	30:1	40:1	53:1	62:1	83:1
J1	0.33	0.25	0.18	0.15	0.19	0.15	0.13	0.18	0.14	0.12	0.13	0.12

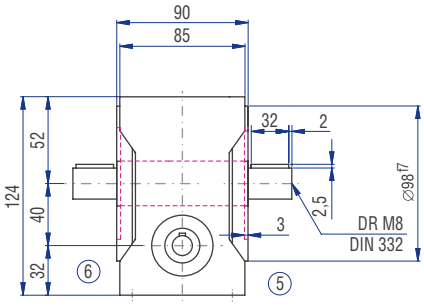
Mass ca. [kg]
6

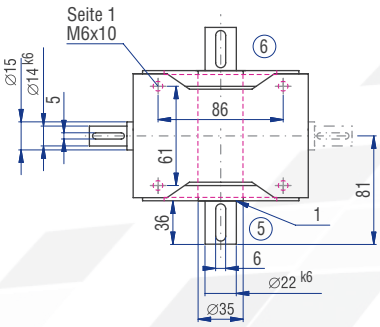


The mass of the gearbox may deviate depending on the gear ratio and the type.

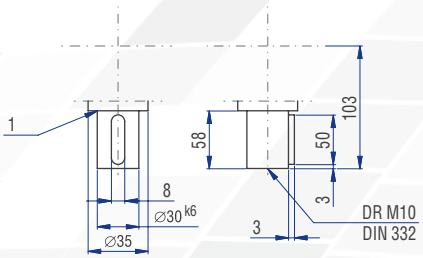


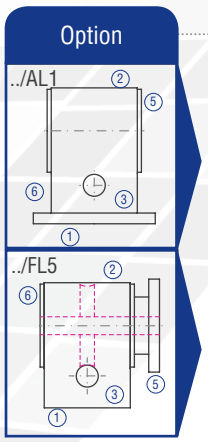


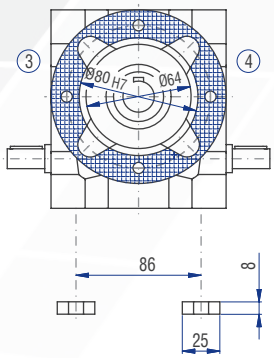


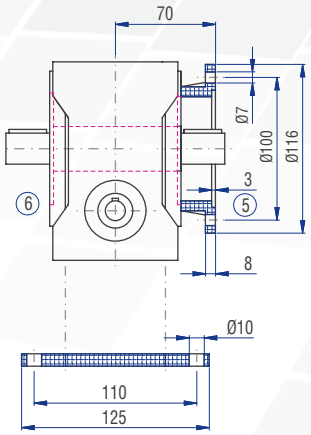


Implementation VV

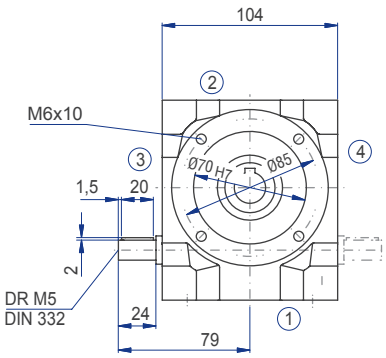


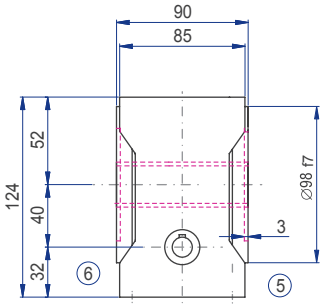


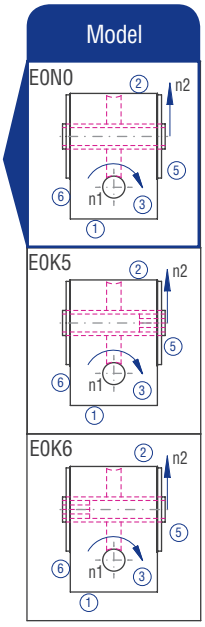


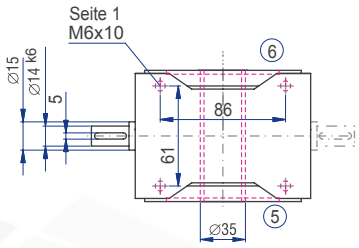


The dimensions of the Models not shown can be figured by mirroring available dimensions.

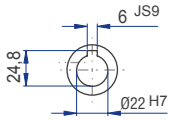




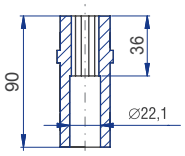


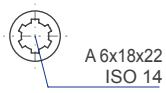


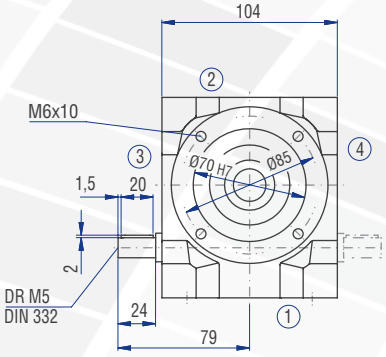
E0N0

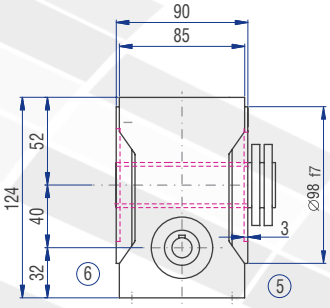


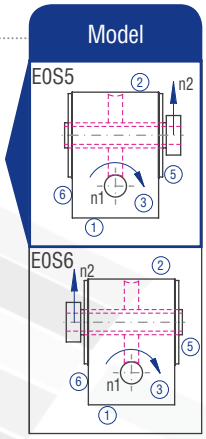
E0K5 / E0K6

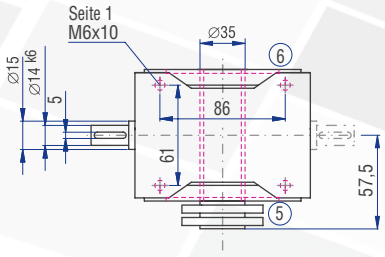


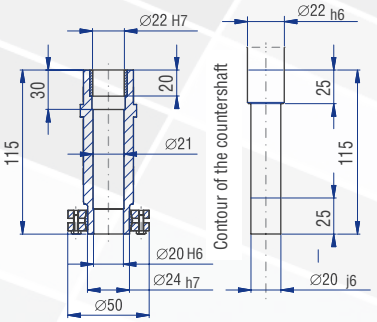




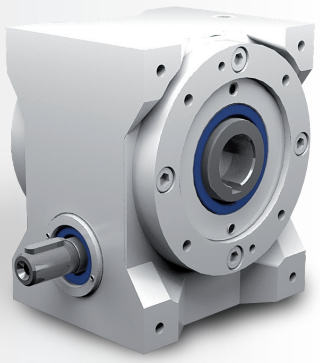








9.3.7 Type S 050 – Standard worm gearboxes



Characteristics

Characteristic	Standard	Option
Toothing	Hardened and ground worm shaft / bronze worm gear	See chapter 9.2.1
Gear ratio	5:1 to 83:1	
Housing / Flanges	Grey cast iron	
Threaded mounting hole	On gearbox side 1 and on the flanges	See chapter 9.2.3
Shaft	Material 1 C45, shaft ends greased Fit with ISO j6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	Material 1 C45, shafts greased Fit with ISO H7 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.3
Radial shaft seal ring	NBR, form A	See chapter 4.8
Ambient temperature	- 10°C to +90°C. The values of the performance tables are valid for 20°C	See chapter 4.9.3
Circumferential backlash	< 30 arcmin	See chapter 9.2.10
Protection class	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness > 40 µm	See chapter 4.4
Bearing life L10h	more than 15,000h	See chapter 4.9.1
Oil change intervals	Not required if the oil temperature is kept < 90°C The lifetime of the bearings can be increased by the factor 1.5 if the oil is changed after the first 500 service hours and then every 5000 service hours.	See chapter 9.2.8
Lubricant	Synthetic lubricants	See chapter 9.2.8

Performance data

i	i ist		n_1 [rpm]					
			3000	1500	1000	750	500	150
5:1	29:6	n_2 [rpm]	600.0	300.0	200.0	150.0	100.0	30.0
		P_{1N} [kW]	4.74	3.29	2.54	2.08	1.47	0.54
		T_{2N} [Nm]	70	96	110	119	125	145
		P_{1NT} [kW]	3.90	2.76	2.10	2.04	1.76	0.00
		Efficiency	0.96	0.95	0.94	0.93	0.92	0.88
7.5:1	29:4	n_2 [rpm]	400.0	200.0	133.0	100.0	66.0	20.0
		P_{1N} [kW]	3.41	2.42	1.84	1.43	1.01	0.40
		T_{2N} [Nm]	74	104	117	120	125	153
		P_{1NT} [kW]	3.16	2.12	1.76	1.57	1.36	0.00
		Efficiency	0.94	0.93	0.92	0.91	0.89	0.83
10:1	38:4	n_2 [rpm]	300.0	150.0	100.0	75.0	50.0	15.0
		P_{1N} [kW]	3.02	1.64	1.15	0.96	0.71	0.26
		T_{2N} [Nm]	85	91	94	103	112	130
		P_{1NT} [kW]	2.82	1.88	1.56	1.40	1.23	0.00
		Efficiency	0.93	0.92	0.90	0.89	0.87	0.82
13:1	51:4	n_2 [rpm]	230.0	115.0	76.0	57.0	38.0	11.0
		P_{1N} [kW]	1.51	0.82	0.58	0.45	0.32	0.12
		T_{2N} [Nm]	55	59	62	64	66	75
		P_{1NT} [kW]	2.51	1.67	0.14	1.27	1.13	0.00
		Efficiency	0.90	0.89	0.88	0.87	0.85	0.80
15:1	29:2	n_2 [rpm]	200.0	100.0	66.0	50.0	33.0	10.0
		P_{1N} [kW]	1.82	1.32	1.02	0.84	0.65	0.26
		T_{2N} [Nm]	74	106	120	131	145	179
		P_{1NT} [kW]	1.91	1.27	1.05	0.94	0.82	0.00
		Efficiency	0.88	0.87	0.85	0.84	0.81	0.74
20:1	38:2	n_2 [rpm]	150.0	75.0	50.0	37.0	25.0	7.5
		P_{1N} [kW]	1.54	1.03	0.73	0.63	0.47	0.18
		T_{2N} [Nm]	81	106	110	123	133	158
		P_{1NT} [kW]	1.70	1.12	0.93	0.84	0.74	0.00
		Efficiency	0.87	0.85	0.83	0.81	0.78	0.72

i	i ist		n_1 [rpm]					
			3000	1500	1000	750	500	150
26:1	51:2	n_2 [rpm]	115.0	57.0	38.0	28.0	19.0	5.8
		P_{1N} [kW]	1.04	0.58	0.42	0.32	0.24	0.09
		T_{2N} [Nm]	71	76	80	82	86	98
		P_{1NT} [kW]	1.51	1.00	0.84	0.76	0.68	0.00
		Efficiency	0.84	0.81	0.79	0.78	0.75	0.70
30:1	29:1	n_2 [rpm]	100.0	50.0	33.0	25.0	16.0	5.0
		P_{1N} [kW]	1.12	0.79	0.59	0.54	0.42	0.18
		T_{2N} [Nm]	82	113	121	144	157	201
		P_{1NT} [kW]	1.14	0.76	0.63	0.06	0.50	0.00
		Efficiency	0.79	0.77	0.74	0.72	0.68	0.59
40:1	38:1	n_2 [rpm]	75.0	37.0	25.0	18.0	12.0	3.8
		P_{1N} [kW]	0.87	0.65	0.52	0.41	0.31	0.13
		T_{2N} [Nm]	80	118	134	137	147	183
		P_{1NT} [kW]	1.02	0.68	0.57	0.52	0.46	0.00
		Efficiency	0.76	0.75	0.71	0.69	0.65	0.57
53:1	51:1	n_2 [rpm]	57.0	28.0	18.0	14.0	9.4	2.8
		P_{1N} [kW]	0.65	0.38	0.27	0.22	0.16	0.06
		T_{2N} [Nm]	77	85	88	91	95	110
		P_{1NT} [kW]	0.92	0.62	0.52	0.48	0.43	0.00
		Efficiency	0.73	0.69	0.67	0.64	0.61	0.55
62:1	62:1	n_2 [rpm]	48.0	24.0	16.0	12.0	8.1	2.4
		P_{1N} [kW]	0.61	0.42	0.31	0.25	0.18	0.06
		T_{2N} [Nm]	81	105	109	112	113	113
		P_{1NT} [kW]	0.75	0.50	0.43	0.39	0.36	0.00
		Efficiency	0.67	0.64	0.60	0.57	0.53	0.45
83:1	83:1	n_2 [rpm]	36.0	18.0	12.0	9.0	6.0	1.8
		P_{1N} [kW]	0.39	0.21	0.15	0.12	0.09	0.03
		T_{2N} [Nm]	59	63	64	66	69	75
		P_{1NT} [kW]	0.70	0.47	0.41	0.37	0.34	0.00
		Efficiency	0.58	0.56	0.54	0.52	0.49	0.44

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

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

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

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

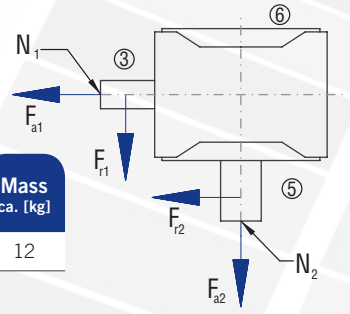
n_2 [rpm]	200		125		75		50		30		10	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 120	2000	1000	2400	1200	2850	1425	3350	1675	4000	2000	4800	2400
> 120	1540	770	1850	925	2190	1095	2580	1290	3080	1540	3700	1850

Inertia moments/mass

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

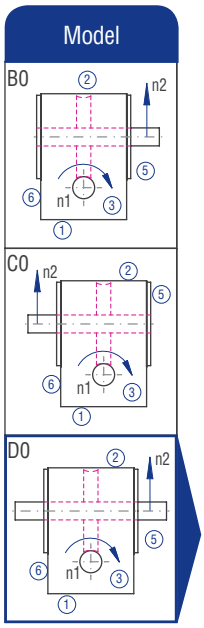
	Inertia moment [kgcm²]											
	5:1	7.5:1	10:1	13:1	15:1	20:1	26:1	30:1	40:1	53:1	62:1	83:1
J1	0.95	0.73	0.58	0.49	0.60	0.50	0.44	0.57	0.48	0.42	0.47	0.42

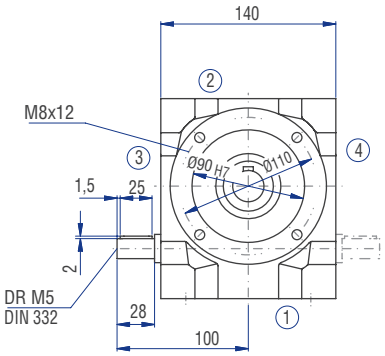
Mass ca. [kg]
12

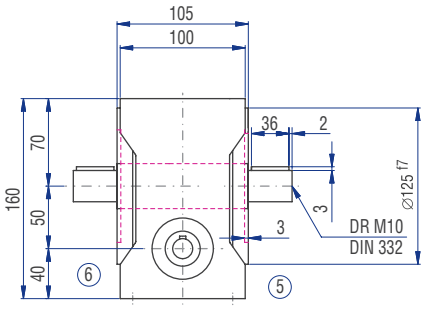


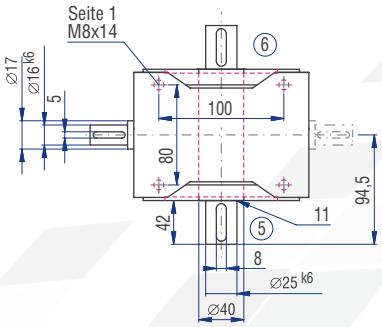
The mass of the gearbox may deviate depending on the gear ratio and the type.

9.3.7 Type S 050 – Standard worm gearboxes

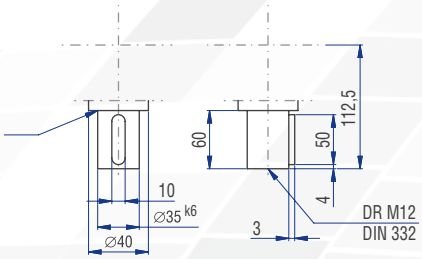


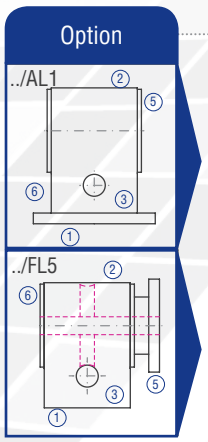


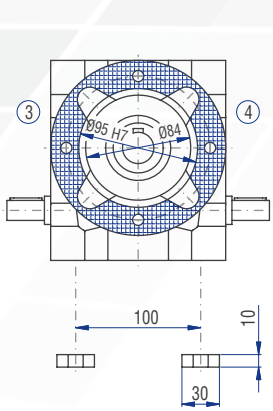


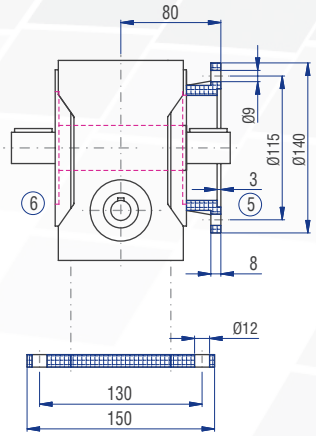


Implementation VV

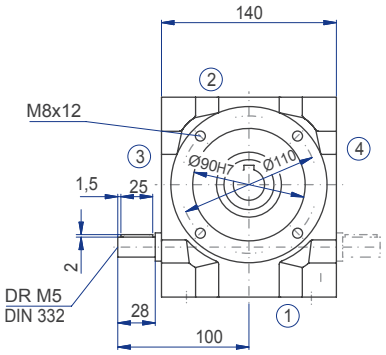


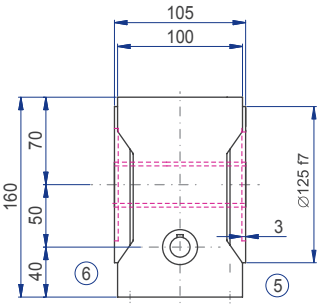


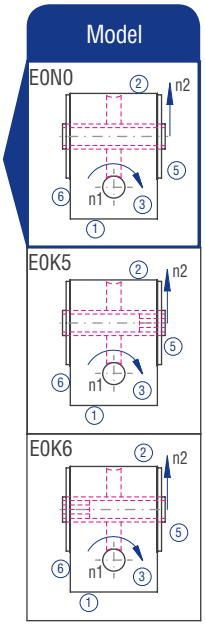


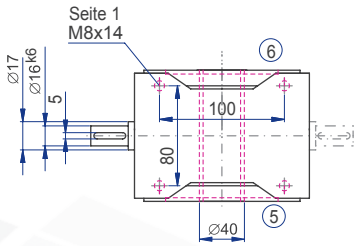


The dimensions of the Models not shown can be figured by mirroring available dimensions.









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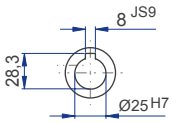
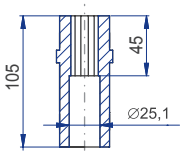
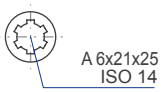
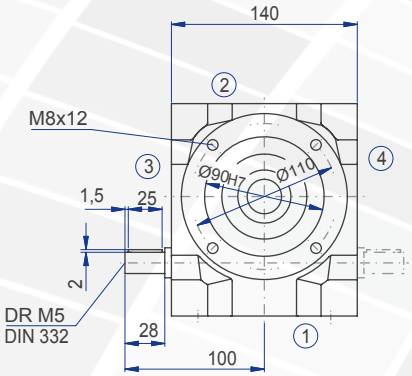
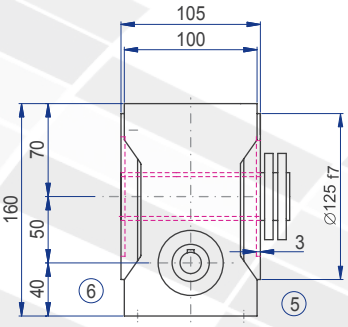


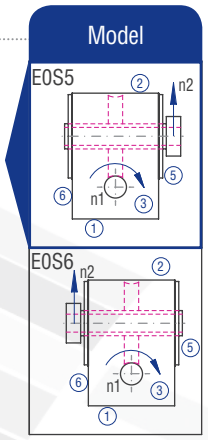
E0K5 / E0K6

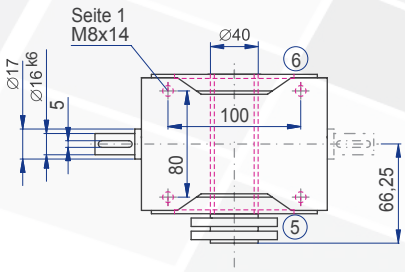


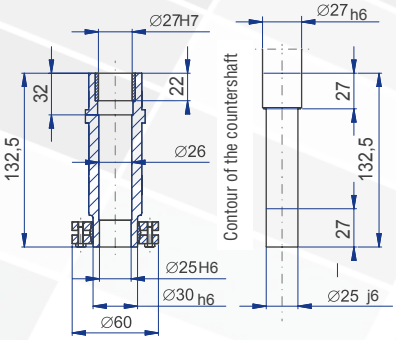




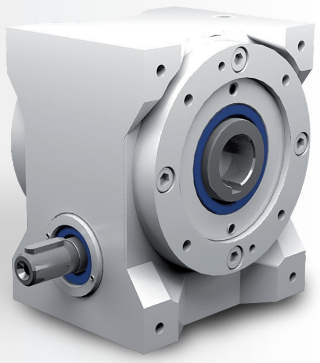








9.3.8 Type S 063 – Standard worm gearboxes



Characteristics

Characteristic	Standard	Option
Toothing	Hardened and ground worm shaft / bronze worm gear	See chapter 9.2.1
Gear ratio	5:1 to 83:1	
Housing / Flanges	Grey cast iron	
Threaded mounting hole	On gearbox side 1 and on the flanges	See chapter 9.2.3
Shaft	Material 1 C45, shaft ends greased Fit with ISO j6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	Material 1 C45, shafts greased Fit with ISO H7 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.3
Radial shaft seal ring	NBR, form A	See chapter 4.8
Ambient temperature	- 10°C to +90°C. The values of the performance tables are valid for 20°C	See chapter 4.9.3
Circumferential backlash	< 30 arcmin	See chapter 9.2.10
Protection class	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness > 40 µm	See chapter 4.4
Bearing life L10h	more than 15,000h	See chapter 4.9.1
Oil change intervals	Not required if the oil temperature is kept < 90°C The lifetime of the bearings can be increased by the factor 1.5 if the oil is changed after the first 500 service hours and then every 5000 service hours.	See chapter 9.2.8
Lubricant	Synthetic lubricants	See chapter 9.2.8

Performance data

i	i ist		n_1 [rpm]					
			3000	1500	1000	750	500	150
5:1	29:6	n_2 [rpm]	600.0	300.0	200.0	150.0	100.0	30.0
		P_{1N} [kW]	6.37	4.96	3.77	3.11	2.31	0.91
		T_{2N} [Nm]	94	145	165	180	198	247
		P_{1NT} [kW]	5.80	4.25	3.56	3.15	2.67	0.00
		Efficiency	0.96	0.95	0.95	0.94	0.93	0.88
7.5:1	29:4	n_2 [rpm]	400.0	200.0	133.0	100.0	66.0	20.0
		P_{1N} [kW]	4.89	3.62	2.78	2.37	1.79	0.72
		T_{2N} [Nm]	106	157	179	201	223	280
		P_{1NT} [kW]	4.63	3.26	2.72	2.41	2.06	0.00
		Efficiency	0.94	0.94	0.93	0.92	0.90	0.84
10:1	39:4	n_2 [rpm]	300.0	150.0	100.0	75.0	50.0	15.0
		P_{1N} [kW]	4.15	2.94	2.26	1.83	1.30	0.51
		T_{2N} [Nm]	121	170	194	207	216	265
		P_{1NT} [kW]	4.16	2.89	2.41	2.15	1.86	0.00
		Efficiency	0.94	0.93	0.92	0.91	0.89	0.83
13:1	51:4	n_2 [rpm]	230.0	115.0	76.0	57.0	38.0	11.0
		P_{1N} [kW]	3.31	1.81	1.29	1.00	0.71	0.26
		T_{2N} [Nm]	125	135	141	145	151	170
		P_{1NT} [kW]	3.68	2.53	2.12	1.90	1.66	0.00
		Efficiency	0.93	0.92	0.90	0.89	0.87	0.82
15:1	29:2	n_2 [rpm]	200.0	100.0	66.0	50.0	33.0	10.0
		P_{1N} [kW]	3.12	2.23	1.77	1.51	1.16	0.48
		T_{2N} [Nm]	128	183	213	240	266	333
		P_{1NT} [kW]	2.80	1.95	1.62	1.44	1.23	0.00
		Efficiency	0.89	0.00	0.00	0.86	0.83	0.75
20:1	39:2	n_2 [rpm]	150.0	75.0	50.0	37.0	25.0	7.5
		P_{1N} [kW]	2.95	1.70	1.32	1.14	0.86	0.34
		T_{2N} [Nm]	161	186	212	237	259	310
		P_{1NT} [kW]	2.52	1.73	1.44	1.29	1.12	0.00
		Efficiency	0.88	0.88	0.86	0.84	0.81	0.74

i	i ist		n_1 [rpm]					
			3000	1500	1000	750	500	150
26:1	51:2	n_2 [rpm]	115.0	57.0	38.0	28.0	19.0	5.8
		P_{1N} [kW]	1.89	1.25	0.90	0.71	0.51	0.19
		T_{2N} [Nm]	132	173	181	187	195	222
		P_{1NT} [kW]	2.21	1.52	1.27	1.14	1.01	0.00
		Efficiency	0.86	0.85	0.83	0.81	0.78	0.71
30:1	29:1	n_2 [rpm]	100.0	50.0	33.0	25.0	16.0	5.0
		P_{1N} [kW]	1.94	1.38	1.11	0.97	0.75	0.36
		T_{2N} [Nm]	143	204	237	268	296	403
		P_{1NT} [kW]	1.66	1.15	0.97	0.86	0.75	0.00
		Efficiency	0.80	0.80	0.77	0.75	0.71	0.61
40:1	39:1	n_2 [rpm]	75.0	37.0	25.0	18.0	12.0	3.8
		P_{1N} [kW]	1.54	1.08	0.85	0.74	0.57	0.24
		T_{2N} [Nm]	149	207	237	264	288	348
		P_{1NT} [kW]	1.50	1.04	0.87	0.78	0.69	0.00
		Efficiency	0.78	0.77	0.75	0.72	0.68	0.59
53:1	51:1	n_2 [rpm]	57.0	28.0	18.0	14.0	9.4	2.8
		P_{1N} [kW]	1.16	0.80	0.58	0.47	0.34	0.14
		T_{2N} [Nm]	143	191	200	207	217	248
		P_{1NT} [kW]	1.34	0.96	0.78	0.71	0.63	0.00
		Efficiency	0.76	0.74	0.71	0.68	0.65	0.56
62:1	61:1	n_2 [rpm]	48.0	24.0	16.0	12.0	8.1	2.4
		P_{1N} [kW]	0.82	0.66	0.53	0.46	0.34	0.12
		T_{2N} [Nm]	110	175	202	221	226	226
		P_{1NT} [kW]	1.10	0.76	0.65	0.59	0.52	0.00
		Efficiency	0.69	0.68	0.65	0.62	0.57	0.47
83:1	82:1	n_2 [rpm]	36.0	18.0	12.0	9.0	6.0	1.8
		P_{1N} [kW]	0.75	0.46	0.33	0.26	0.19	0.07
		T_{2N} [Nm]	129	152	152	152	152	152
		P_{1NT} [kW]	0.99	0.69	0.59	0.54	0.49	0.00
		Efficiency	0.66	0.63	0.59	0.56	0.52	0.44

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

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

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

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

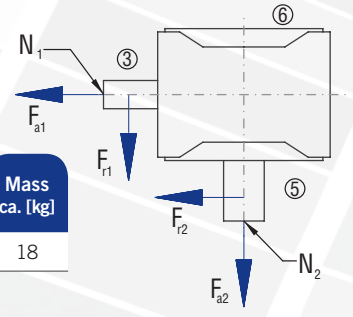
n_2 [rpm]	200		125		75		50		30		10	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 220	2700	1350	3150	1575	3800	1900	4500	2250	5200	2600	5200	2600
> 220	2080	1040	2420	1210	2920	1460	3460	1730	4000	2000	4000	2000

Inertia moments/mass

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

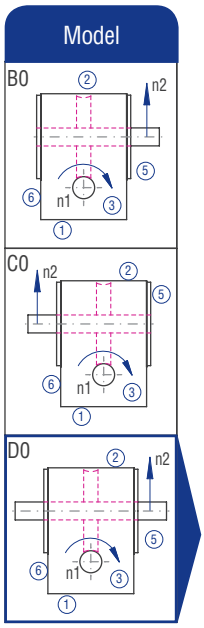
	Inertia moment [kgcm^2]											
	5:1	7.5:1	10:1	13:1	15:1	20:1	26:1	30:1	40:1	53:1	62:1	83:1
J1	2.17	1.64	1.14	0.94	1.33	0.94	0.82	1.25	0.90	0.79	0.97	0.80

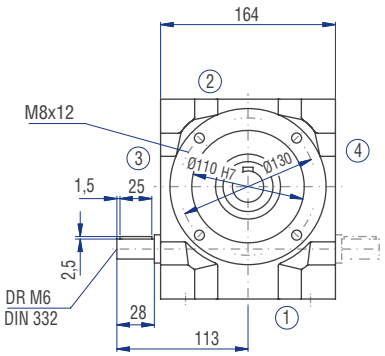
Mass ca. [kg]
18

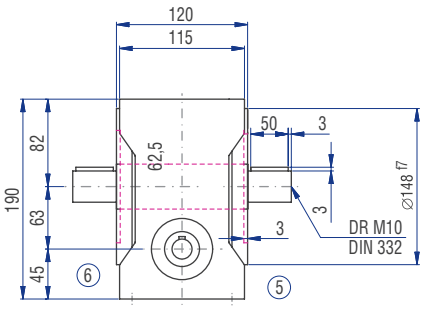


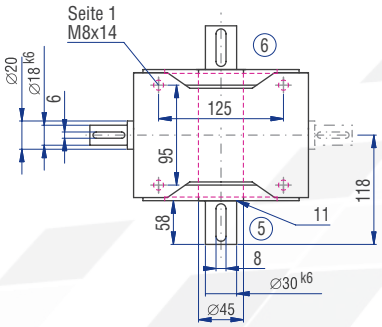
The mass of the gearbox may deviate depending on the gear ratio and the type.

9.3.8 Type S 063 – Standard worm gearboxes

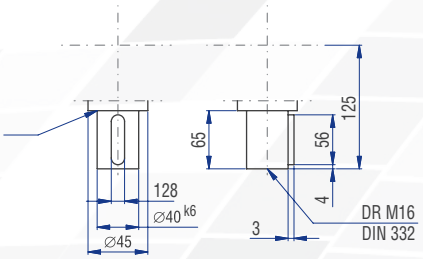


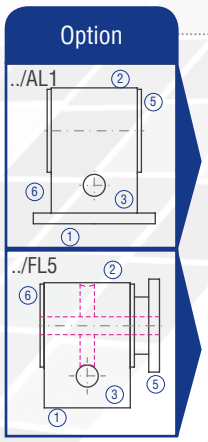


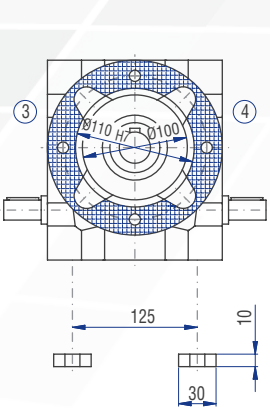


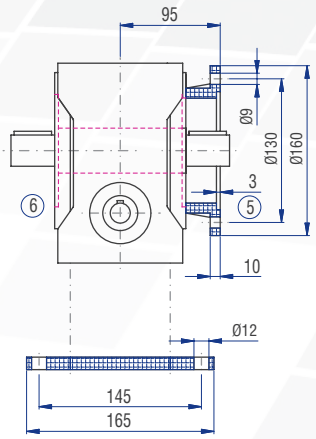


Implementation VV

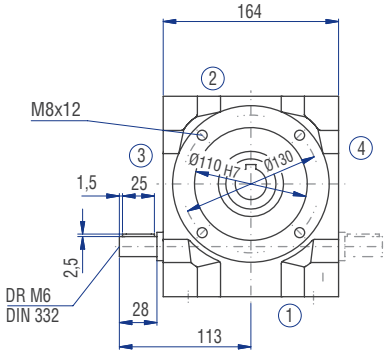


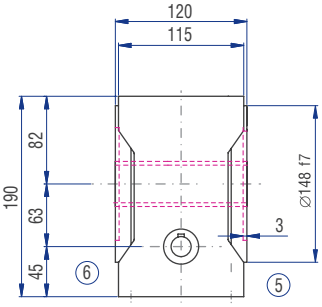


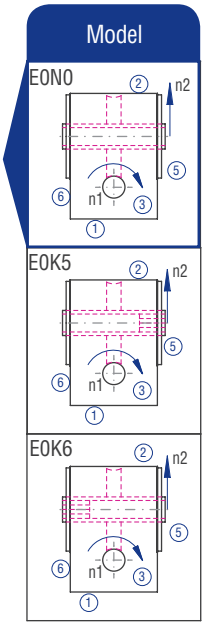


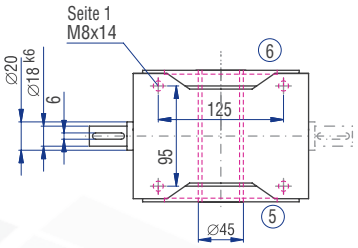


The dimensions of the Models not shown can be figured by mirroring available dimensions.

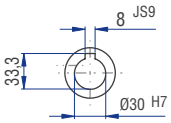




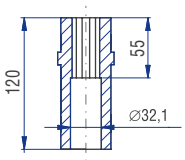


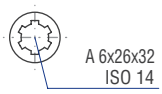


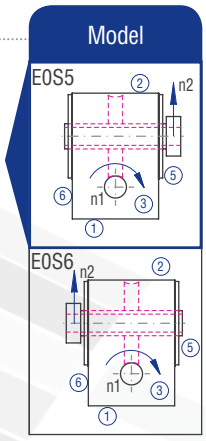
E0N0

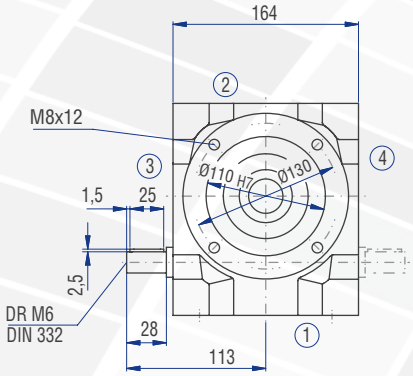


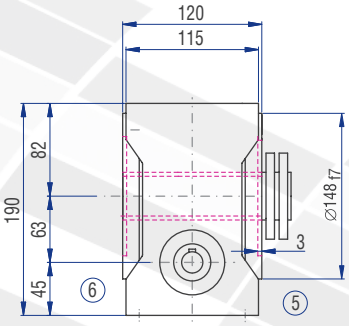
E0K5 / E0K6

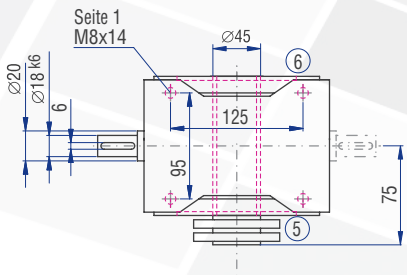


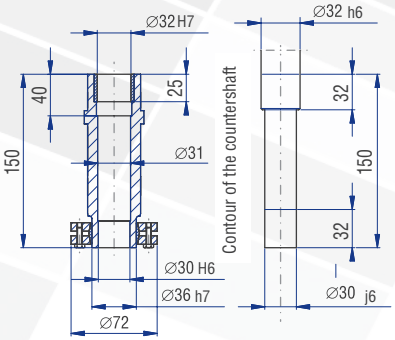




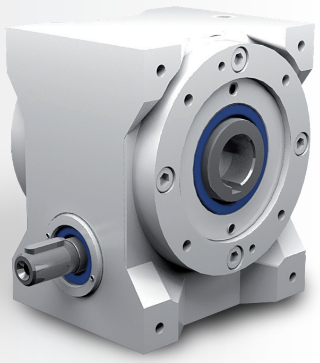








9.3.9 Type S 080 – Standard worm gearboxes



Characteristics

Characteristic	Standard	Option
Toothing	Hardened and ground worm shaft / bronze worm gear	See chapter 9.2.1
Gear ratio	5:1 to 83:1	
Housing / Flanges	Grey cast iron	
Threaded mounting hole	On gearbox side 1 and on the flanges	See chapter 9.2.3
Shaft	Material 1 C45, shaft ends greased Fit with ISO j6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	Material 1 C45, shafts greased Fit with ISO H7 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.3
Radial shaft seal ring	NBR, form A	See chapter 4.8
Ambient temperature	- 10°C to +90°C. The values of the performance tables are valid for 20°C	See chapter 4.9.3
Circumferential backlash	< 30 arcmin	See chapter 9.2.10
Protection class	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness > 40 µm	See chapter 4.4
Bearing life L10h	more than 15,000h	See chapter 4.9.1
Oil change intervals	Not required if the oil temperature is kept < 90°C The lifetime of the bearings can be increased by the factor 1.5 if the oil is changed after the first 500 service hours and then every 5000 service hours.	See chapter 9.2.8
Lubricant	Synthetic lubricants	See chapter 9.2.8

Performance data

i	i ist		n_1 [rpm]					
			3000	1500	1000	750	500	150
5:1	30:6	n_2 [rpm]	600.0	300.0	200.0	150.0	100.0	30.0
		P_{1N} [kW]	11.13	8.18	4.36	5.55	4.01	1.58
		T_{2N} [Nm]	170	250	298	332	360	448
		P_{1NT} [kW]	8.62	6.68	5.70	5.05	4.24	0.00
		Efficiency	0.96	0.96	0.95	0.94	0.94	0.89
7.5:1	30:4	n_2 [rpm]	400.0	200.0	133.0	100.0	66.0	20.0
		P_{1N} [kW]	8.64	6.37	5.01	4.36	3.33	1.39
		T_{2N} [Nm]	196	289	341	391	439	569
		P_{1NT} [kW]	6.69	5.14	4.37	3.88	3.27	0.00
		Efficiency	0.95	0.95	0.95	0.94	0.92	0.86
10:1	40:4	n_2 [rpm]	300.0	150.0	100.0	75.0	50.0	15.0
		P_{1N} [kW]	6.58	4.96	3.79	3.15	2.35	0.96
		T_{2N} [Nm]	197	297	340	373	408	513
		P_{1NT} [kW]	5.92	4.47	3.79	3.36	2.86	0.00
		Efficiency	0.94	0.94	0.94	0.93	0.91	0.84
13:1	53:4	n_2 [rpm]	230.0	115.0	76.0	57.0	38.0	11.0
		P_{1N} [kW]	4.41	2.41	1.70	1.33	0.94	0.34
		T_{2N} [Nm]	173	187	196	202	210	236
		P_{1NT} [kW]	5.27	3.91	3.32	2.96	2.56	0.00
		Efficiency	0.93	0.92	0.91	0.90	0.88	0.83
15:1	30:2	n_2 [rpm]	200.0	100.0	66.0	50.0	33.0	10.0
		P_{1N} [kW]	5.61	4.10	3.26	2.81	2.18	0.93
		T_{2N} [Nm]	241	352	415	473	530	681
		P_{1NT} [kW]	4.08	3.09	2.62	2.32	1.97	0.00
		Efficiency	0.90	0.90	0.89	0.88	0.85	0.77
20:1	40:2	n_2 [rpm]	150.0	75.0	50.0	37.0	25.0	7.5
		P_{1N} [kW]	4.24	3.04	2.37	2.05	1.57	0.64
		T_{2N} [Nm]	240	344	399	450	498	615
		P_{1NT} [kW]	3.59	2.67	2.26	2.01	1.72	0.00
		Efficiency	0.89	0.89	0.88	0.86	0.83	0.75

i	i ist		n_1 [rpm]					
			3000	1500	1000	750	500	150
26:1	53:2	n_2 [rpm]	115.0	57.0	38.0	28.0	19.0	5.8
		P_{1N} [kW]	2.83	1.67	1.19	0.94	0.68	0.25
		T_{2N} [Nm]	210	245	256	264	275	312
		P_{1NT} [kW]	3.19	2.34	1.99	1.78	1.55	0.00
		Efficiency	0.88	0.87	0.85	0.83	0.80	0.73
30:1	30:1	n_2 [rpm]	100.0	50.0	33.0	25.0	16.0	5.0
		P_{1N} [kW]	3.47	2.52	2.03	1.78	1.38	0.63
		T_{2N} [Nm]	272	395	456	530	593	760
		P_{1NT} [kW]	2.41	1.81	1.54	1.38	1.18	0.00
		Efficiency	0.82	0.82	0.80	0.78	0.75	0.63
40:1	40:1	n_2 [rpm]	75.0	37.0	25.0	18.0	12.0	3.8
		P_{1N} [kW]	2.62	1.87	1.49	1.31	1.02	0.40
		T_{2N} [Nm]	267	381	443	501	553	625
		P_{1NT} [kW]	2.14	1.58	1.35	1.21	1.05	0.00
		Efficiency	0.80	0.80	0.78	0.75	0.71	0.61
53:1	53:1	n_2 [rpm]	57.0	28.0	18.0	14.0	9.4	2.8
		P_{1N} [kW]	1.78	1.04	0.76	0.61	0.45	0.18
		T_{2N} [Nm]	234	271	284	294	308	352
		P_{1NT} [kW]	1.93	1.41	1.20	1.09	0.96	0.00
		Efficiency	0.78	0.77	0.74	0.71	0.68	0.58
62:1	62:1	n_2 [rpm]	48.0	24.0	16.0	12.0	8.1	2.4
		P_{1N} [kW]	1.40	1.01	0.81	0.69	0.54	0.23
		T_{2N} [Nm]	194	279	325	352	393	448
		P_{1NT} [kW]	1.55	1.15	0.98	0.89	0.78	0.00
		Efficiency	0.70	0.70	0.68	0.65	0.61	0.49
83:1	82:1	n_2 [rpm]	36.0	18.0	12.0	9.0	6.0	1.8
		P_{1N} [kW]	1.10	0.90	0.64	0.49	0.35	0.13
		T_{2N} [Nm]	196	304	304	304	304	304
		P_{1NT} [kW]	1.43	1.04	0.90	0.82	0.73	0.00
		Efficiency	0.68	0.65	0.61	0.59	0.55	0.46

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

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

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

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

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

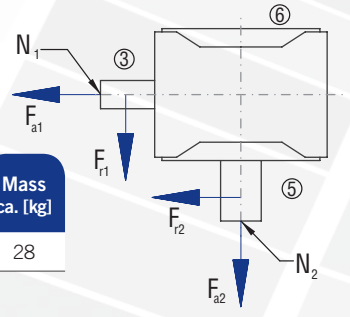
Inertia moments/mass

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

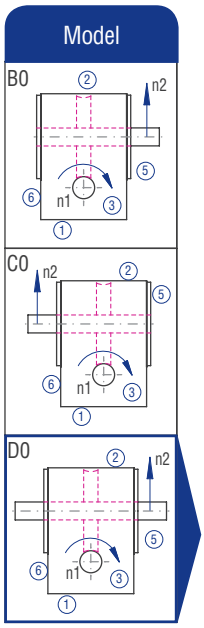
	Inertia moment [kgcm^2]											
	5:1	7.5:1	10:1	13:1	15:1	20:1	26:1	30:1	40:1	53:1	62:1	83:1
J1	5.82	4.22	2.96	2.26	3.26	2.40	1.91	3.01	2.26	1.82	2.51	1.91

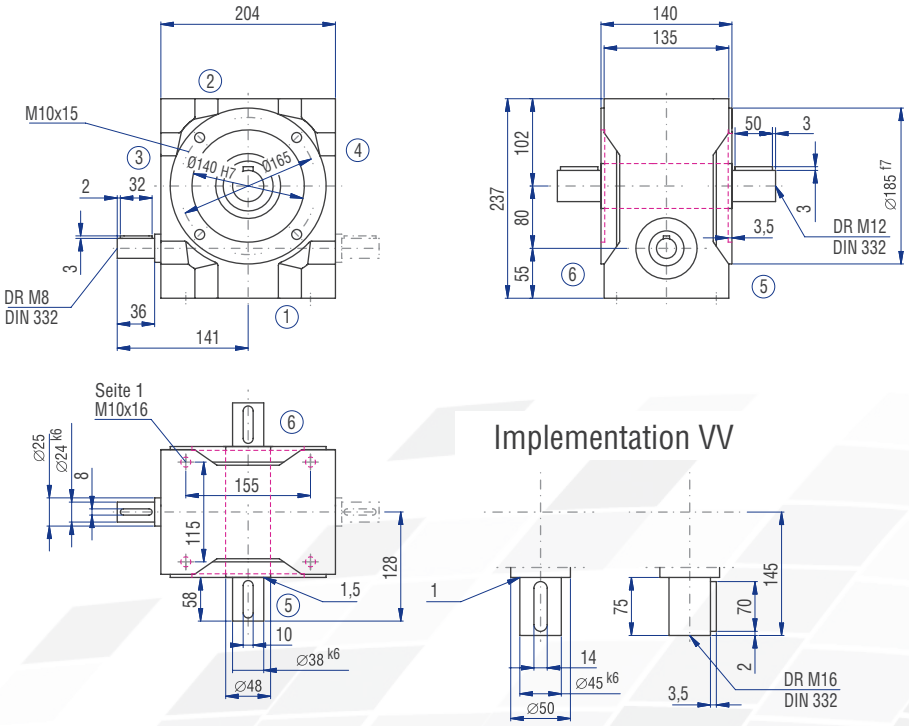
The mass of the gearbox may deviate depending on the gear ratio and the type.

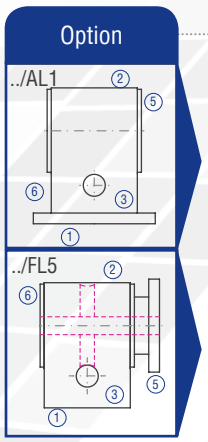
Mass ca. [kg]
28

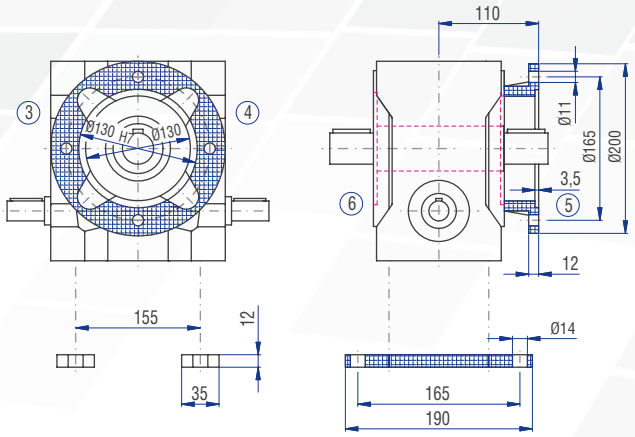


9.3.9 Type S 080 – Standard worm gearboxes

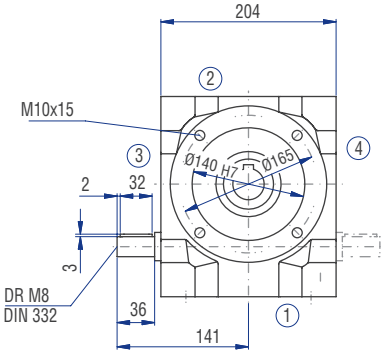


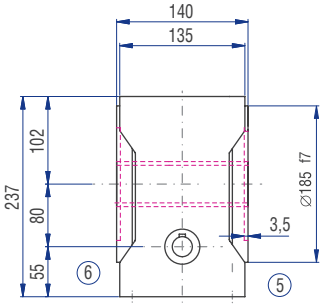


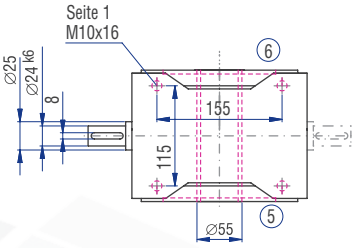




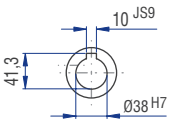
The dimensions of the Models not shown can be figured by mirroring available dimensions.



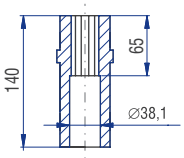


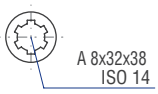


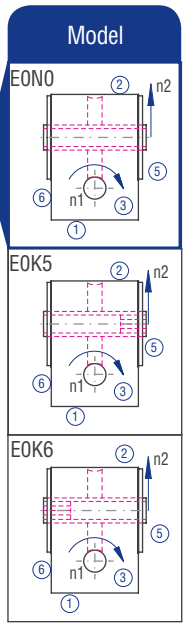
E0N0

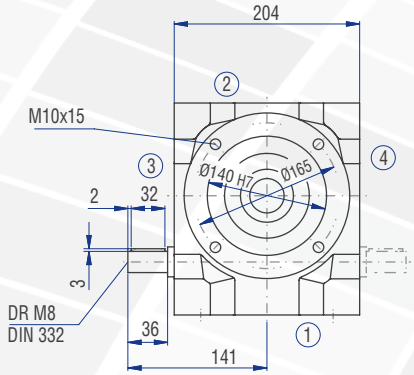


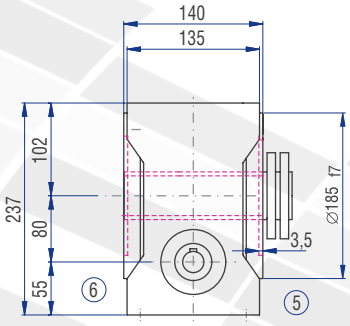
E0K5 / E0K6

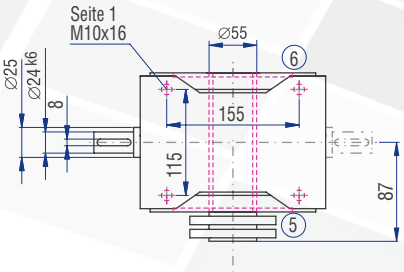


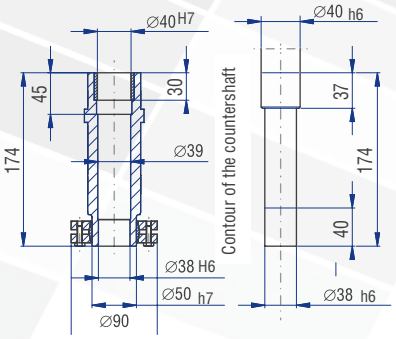


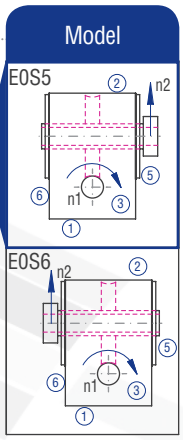




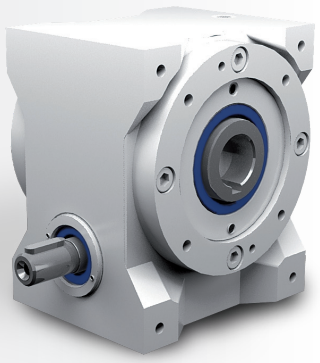








9.3.10 Type S 100 – Standard worm gearboxes



Characteristics

Characteristic	Standard	Option
Toothing	Hardened and ground worm shaft / bronze worm gear	See chapter 9.2.1
Gear ratio	5:1 to 83:1	
Housing / Flanges	Grey cast iron	
Threaded mounting hole	On gearbox side 1 and on the flanges	See chapter 9.2.3
Shaft	Material 1 C45, shaft ends greased Fit with ISO j6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	Material 1 C45, shafts greased Fit with ISO H7 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.3
Radial shaft seal ring	NBR, form A	See chapter 4.8
Ambient temperature	- 10°C to +90°C. The values of the performance tables are valid for 20°C	See chapter 4.9.3
Circumferential backlash	< 30 arcmin	See chapter 9.2.10
Protection class	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness > 40 µm	See chapter 4.4
Bearing life L10h	more than 15,000h	See chapter 4.9.1
Oil change intervals	Not required if the oil temperature is kept < 90°C The lifetime of the bearings can be increased by the factor 1.5 if the oil is changed after the first 500 service hours and then every 5000 service hours.	See chapter 9.2.8
Lubricant	Synthetic lubricants	See chapter 9.2.8

Performance data

i	i ist		n_1 [1/min]					
			3000	1500	1000	750	500	150
5:1	30:6	n_2 [1/min]	600,0	300,0	200,0	150,0	100,0	30,0
		P_{1N} [kW]	29,45	19,31	14,99	12,45	9,47	4,01
		T_{2N} [Nm]	450	590	680	745	850	1.150
		P_{1NT} [kW]	11,30	8,60	7,55	6,87	5,96	0,00
		Wirkungsgrad	0,96	0,96	0,95	0,94	0,94	0,90
7,5:1	30:4	n_2 [1/min]	400,0	200,0	133,0	100,0	66,0	20,0
		P_{1N} [kW]	22,62	14,33	10,92	9,10	7,00	3,03
		T_{2N} [Nm]	513	650	743	817	932	1.258
		P_{1NT} [kW]	9,06	6,85	5,99	5,43	4,71	0,00
		Wirkungsgrad	0,95	0,95	0,95	0,94	0,93	0,87
10:1	40:4	n_2 [1/min]	300,0	150,0	100,0	75,0	50,0	15,0
		P_{1N} [kW]	18,55	11,75	8,95	7,45	5,79	2,02
		T_{2N} [Nm]	555	703	803	882	1.006	1.095
		P_{1NT} [kW]	8,57	6,35	5,49	4,95	4,30	0,00
		Wirkungsgrad	0,94	0,94	0,94	0,93	0,91	0,85
13:1	52:4	n_2 [1/min]	230,0	115,0	76,0	57,0	38,0	11,0
		P_{1N} [kW]	11,09	6,09	4,30	3,37	2,37	0,85
		T_{2N} [Nm]	427	464	486	502	523	586
		P_{1NT} [kW]	7,87	5,73	4,92	4,43	3,85	0,00
		Wirkungsgrad	0,93	0,92	0,91	0,90	0,89	0,83
15:1	30:2	n_2 [1/min]	200,0	100,0	66,0	50,0	33,0	10,0
		P_{1N} [kW]	13,12	8,32	6,41	5,34	4,16	1,88
		T_{2N} [Nm]	564	715	817	898	1.025	1.386
		P_{1NT} [kW]	5,76	4,31	3,75	3,40	2,95	0,00
		Wirkungsgrad	0,90	0,90	0,89	0,88	0,86	0,77
20:1	40:2	n_2 [1/min]	150,0	75,0	50,0	37,0	25,0	7,5
		P_{1N} [kW]	10,84	6,87	5,28	4,45	3,47	1,49
		T_{2N} [Nm]	614	778	888	975	1.112	1.441
		P_{1NT} [kW]	5,44	3,99	3,44	3,10	2,69	0,00
		Wirkungsgrad	0,89	0,89	0,88	0,86	0,84	0,76

i	i ist		n_1 [1/min]					
			3000	1500	1000	750	500	150
26:1	52:2	n_2 [1/min]	115,0	57,0	38,0	28,0	19,0	5,8
		P_{1N} [kW]	7,63	4,20	3,00	2,38	1,72	0,64
		T_{2N} [Nm]	556	605	634	655	683	773
		P_{1NT} [kW]	4,94	3,57	3,06	2,75	2,40	0,00
		Wirkungsgrad	0,88	0,87	0,85	0,83	0,80	0,73
30:1	30:1	n_2 [1/min]	100,0	50,0	33,0	25,0	16,0	5,0
		P_{1N} [kW]	7,53	4,78	3,60	3,19	2,51	1,18
		T_{2N} [Nm]	590	748	825	950	1.080	1.437
		P_{1NT} [kW]	3,50	2,60	2,27	2,06	1,81	0,00
		Wirkungsgrad	0,82	0,82	0,80	0,78	0,75	0,64
40:1	40:1	n_2 [1/min]	75,0	37,0	25,0	18,0	12,0	3,8
		P_{1N} [kW]	6,33	4,01	3,13	2,65	2,13	1,00
		T_{2N} [Nm]	645	817	933	1.025	1.169	1.581
		P_{1NT} [kW]	3,32	2,42	2,09	1,90	1,67	0,00
		Wirkungsgrad	0,80	0,80	0,78	0,76	0,72	0,62
53:1	52:1	n_2 [1/min]	57,0	28,0	18,0	14,0	9,4	2,8
		P_{1N} [kW]	4,76	2,63	1,92	1,53	1,11	0,45
		T_{2N} [Nm]	615	670	704	728	762	870
		P_{1NT} [kW]	3,04	2,19	1,88	1,71	1,51	0,00
		Wirkungsgrad	0,78	0,77	0,74	0,72	0,69	0,59
62:1	63:1	n_2 [1/min]	48,0	24,0	16,0	12,0	8,1	2,4
		P_{1N} [kW]	4,59	2,91	2,17	1,70	1,21	0,44
		T_{2N} [Nm]	645	817	886	886	886	886
		P_{1NT} [kW]	2,39	1,74	1,52	1,39	1,24	0,00
		Wirkungsgrad	0,70	0,70	0,68	0,65	0,61	0,50
83:1	82:1	n_2 [1/min]	36,0	18,0	12,0	9,0	6,0	1,8
		P_{1N} [kW]	3,33	1,74	1,23	0,94	0,67	0,24
		T_{2N} [Nm]	591	599	599	599	599	599
		P_{1NT} [kW]	2,24	1,61	1,40	1,28	1,15	0,00
		Wirkungsgrad	0,68	0,66	0,62	0,61	0,57	0,47

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

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

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

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

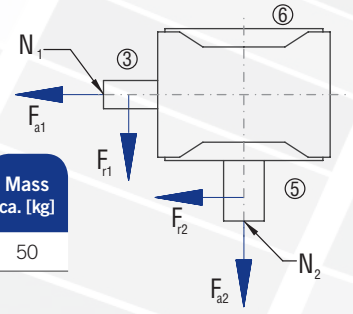
n_2 [rpm]	200		125		75		50		30		10	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 800	3650	1825	4000	2000	4750	2375	5600	2800	6700	3350	9500	4750
> 800	2920	1460	3200	1600	3800	1900	4480	2240	5360	2680	7600	3800

Inertia moments/mass

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

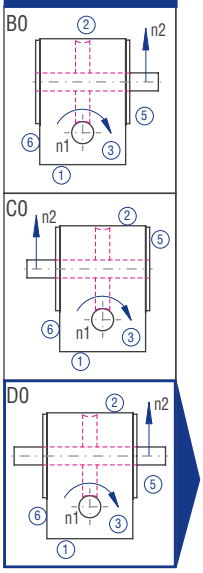
	Inertia moment [kgcm²]											
	5:1	7.5:1	10:1	13:1	15:1	20:1	26:1	30:1	40:1	53:1	62:1	83:1
J1	22.38	17.88	14.03	12.28	15.17	12.37	11.34	14.50	11.96	11.10	12.56	11.34

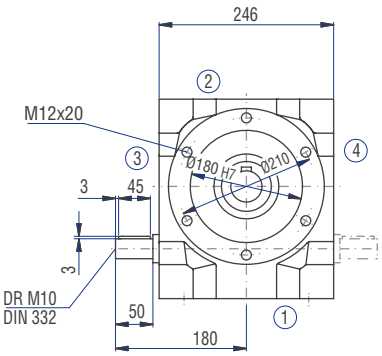
Mass ca. [kg]
50

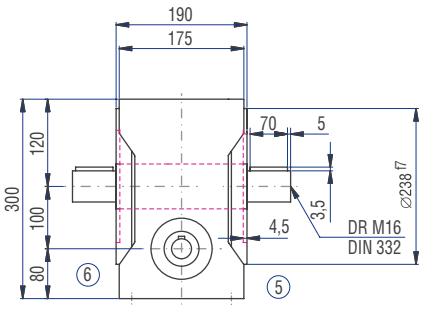


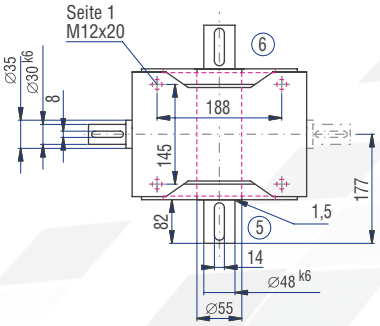
The mass of the gearbox may deviate depending on the gear ratio and the type.

Model

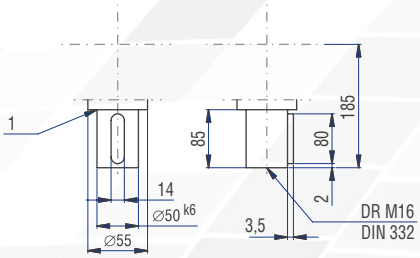




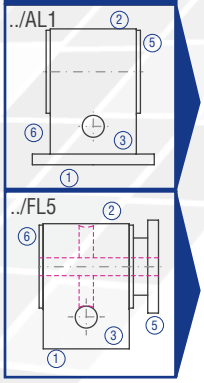


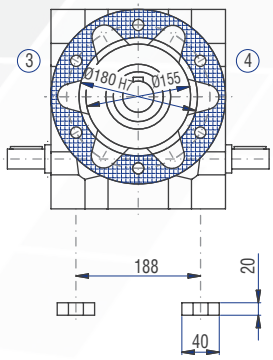


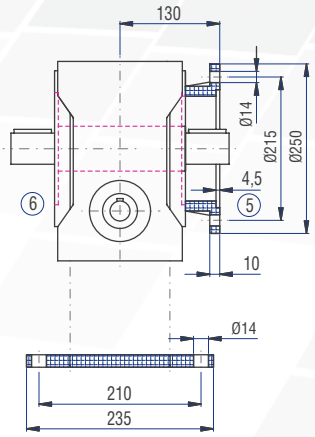
Implementation VV



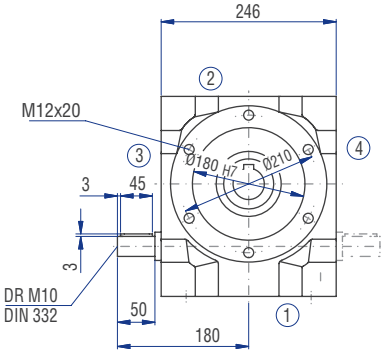
Option

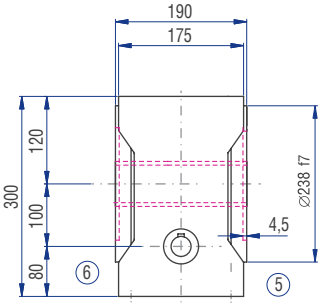


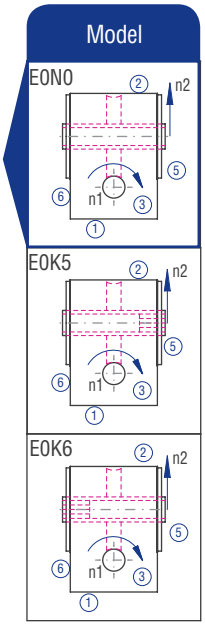


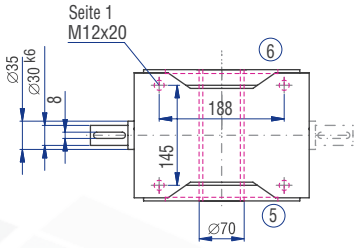


The dimensions of the Models not shown can be figured by mirroring available dimensions.

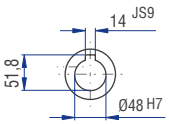




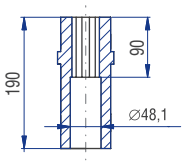


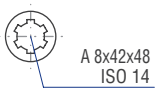


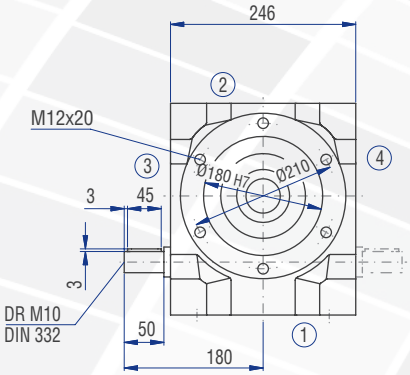
E0N0

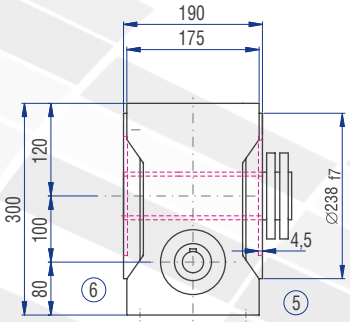


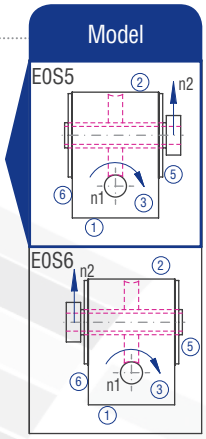
E0K5 / E0K6

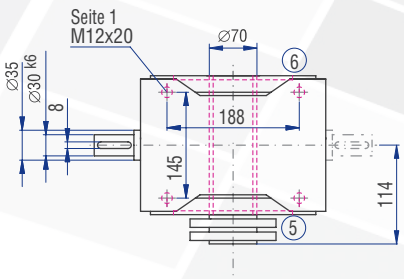


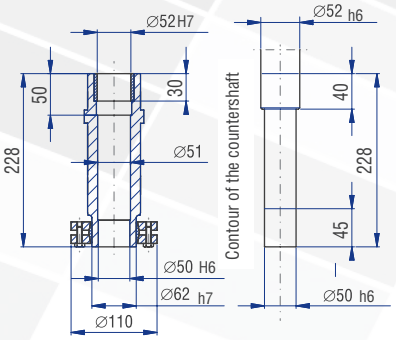




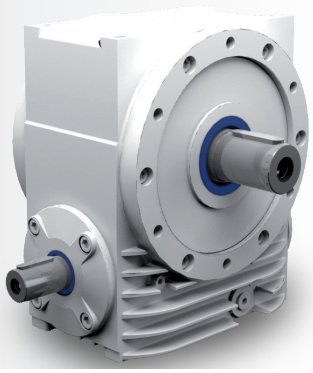








9.3.11 Type S 125 – Standard worm gearboxes



Characteristics

Characteristic	Standard	Option
Toothing	Hardened and ground worm shaft / bronze worm gear	See chapter 9.2.1
Gear ratio	5:1 to 83:1	
Housing / Flanges	Grey cast iron	
Threaded mounting hole	On gearbox sides 1, 2 and on the flanges	See chapter 9.2.3
Shaft	Material 1 C45, shaft ends greased Fit with ISO j6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	Material: GGG grey cast iron; shafts greased Fit with ISO H7 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.3
Radial shaft seal ring	NBR, form A	See chapter 4.8
Ambient temperature	- 10°C to +90°C. The values of the performance tables are valid for 20°C	See chapter 4.9.3
Circumferential backlash	< 30 arcmin	See chapter 9.2.10
Protection class	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness > 40 µm	See chapter 4.4
Bearing life L10h	more than 15,000h	See chapter 4.9.1
Oil change intervals	Not required if the oil temperature is kept < 90°C The lifetime of the bearings can be increased by the factor 1.5 if the oil is changed after the first 500 service hours and then every 5000 service hours.	See chapter 9.2.8
Lubricant	Synthetic lubricants	See chapter 9.2.8

Performance data

i	i ist		n_1 [rpm]					
			3000	1500	1000	750	500	150
5:1	29:6	n_2 [rpm]	600.0	300.0	200.0	150.0	100.0	30.0
		P_{1N} [kW]	42.41	30.32	23.15	19.34	14.72	6.29
		T_{2N} [Nm]	626	895	1,025	1,130	1,290	1,760
		P_{1NT} [kW]	17.93	14.48	13.01	11.94	10.40	0.00
		Efficiency	0.96	0.96	0.96	0.95	0.95	0.91
7.5:1	29:4	n_2 [rpm]	400.0	200.0	133.0	100.0	66.0	20.0
		P_{1N} [kW]	35.71	22.49	17.13	14.13	11.03	4.96
		T_{2N} [Nm]	738	986	1,127	1,239	1,436	2,016
		P_{1NT} [kW]	14.40	11.53	10.31	9.44	8.20	0.00
		Efficiency	0.95	0.95	0.95	0.95	0.94	0.88
10:1	40:4	n_2 [rpm]	300.0	150.0	100.0	75.0	50.0	15.0
		P_{1N} [kW]	28.41	17.86	13.61	11.22	8.62	3.78
		T_{2N} [Nm]	850	1,069	1,222	1,343	1,532	2,092
		P_{1NT} [kW]	13.62	10.68	9.41	8.54	7.37	0.00
		Efficiency	0.94	0.94	0.94	0.94	0.93	0.87
13:1	52:4	n_2 [rpm]	230.0	115.0	76.0	57.0	38.0	11.0
		P_{1N} [kW]	18.19	10.02	7.00	5.42	3.86	1.37
		T_{2N} [Nm]	700	763	800	826	862	966
		P_{1NT} [kW]	12.83	9.84	8.56	7.72	6.65	0.00
		Efficiency	0.93	0.92	0.92	0.92	0.90	0.85
15:1	29:2	n_2 [rpm]	200.0	100.0	66.0	50.0	33.0	10.0
		P_{1N} [kW]	20.06	12.61	10.01	8.88	6.91	3.21
		T_{2N} [Nm]	862	1,084	1,290	1,510	1,743	2,423
		P_{1NT} [kW]	9.13	7.24	6.44	5.88	5.10	0.00
		Efficiency	0.90	0.90	0.90	0.89	0.88	0.79
20:1	40:2	n_2 [rpm]	150.0	75.0	50.0	37.0	25.0	7.5
		P_{1N} [kW]	16.59	10.44	7.95	6.74	5.23	2.33
		T_{2N} [Nm]	940	1,183	1,352	1,510	1,717	2,310
		P_{1NT} [kW]	8.61	6.68	5.86	5.31	4.58	0.00
		Efficiency	0.89	0.89	0.89	0.88	0.86	0.78

i	i ist		n_1 [rpm]					
			3000	1500	1000	750	500	150
26:1	52:2	n_2 [rpm]	115.0	57.0	38.0	28.0	19.0	5.8
		P_{1N} [kW]	12.76	7.03	4.97	3.90	2.78	1.04
		T_{2N} [Nm]	929	1,012	1,062	1,097	1,146	1,294
		P_{1NT} [kW]	8.09	6.14	5.32	4.80	4.14	0.00
		Efficiency	0.88	0.87	0.86	0.85	0.83	0.75
30:1	30:1	n_2 [rpm]	100.0	50.0	33.0	25.0	16.0	5.0
		P_{1N} [kW]	11.76	7.49	6.38	5.65	4.52	1.86
		T_{2N} [Nm]	901	1,134	1,448	1,690	1,952	2,270
		P_{1NT} [kW]	5.50	4.31	3.83	3.51	3.08	0.00
		Efficiency	0.83	0.82	0.82	0.81	0.78	0.66
40:1	40:1	n_2 [rpm]	75.0	37.0	25.0	18.0	12.0	3.8
		P_{1N} [kW]	9.57	6.10	4.81	4.25	3.35	1.42
		T_{2N} [Nm]	987	1,242	1,470	1,690	1,922	2,310
		P_{1NT} [kW]	5.22	4.00	3.52	3.20	2.79	0.00
		Efficiency	0.81	0.80	0.80	0.78	0.75	0.64
53:1	52:1	n_2 [rpm]	57.0	28.0	18.0	14.0	9.4	2.8
		P_{1N} [kW]	7.93	4.44	3.15	2.48	1.83	0.73
		T_{2N} [Nm]	1,037	1,132	1,189	1,230	1,289	1,470
		P_{1NT} [kW]	4.93	3.71	3.23	2.93	2.56	0.00
		Efficiency	0.79	0.77	0.76	0.75	0.71	0.61
62:1	62:1	n_2 [rpm]	48.0	24.0	16.0	12.0	8.1	2.4
		P_{1N} [kW]	6.86	4.37	3.38	2.87	2.25	0.84
		T_{2N} [Nm]	988	1,243	1,421	1,562	1,731	1,731
		P_{1NT} [kW]	3.75	2.86	2.52	2.32	2.05	0.00
		Efficiency	0.73	0.72	0.71	0.69	0.65	0.52
83:1	83:1	n_2 [rpm]	36.0	18.0	12.0	9.0	6.0	1.8
		P_{1N} [kW]	5.72	3.30	2.23	1.73	1.23	0.46
		T_{2N} [Nm]	1,043	1,167	1,167	1,167	1,167	1,167
		P_{1NT} [kW]	3.55	2.66	2.33	2.13	1.89	0.00
		Efficiency	0.69	0.67	0.66	0.64	0.60	0.48

	5:1	7.5:1	10:1	13:1	15:1	20:1	26:1	30:1	40:1	53:1	62:1	83:1
T_{2max} [Nm]	2250	2250	2250	1190	2250	2392	1630	2270	2320	1810	2010	1950

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

n_1 [rpm]	3000		1500		1000		750		500		150	
T_1 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 120	2000	1000	2500	1250	2800	1400	3100	1550	3500	1750	4000	2000
> 120	1540	770	1920	960	2150	1075	2390	1195	2690	1345	3070	1535

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

n_2 [rpm]	200		125		75		50		30		10	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 1300	4700	2350	5300	2650	6300	3150	7500	3750	9000	4500	11000	5500
> 1300	3760	1880	4240	2120	5040	2520	6000	3000	7200	3600	8800	4400

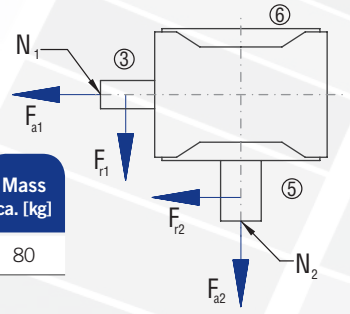
Inertia moments/mass

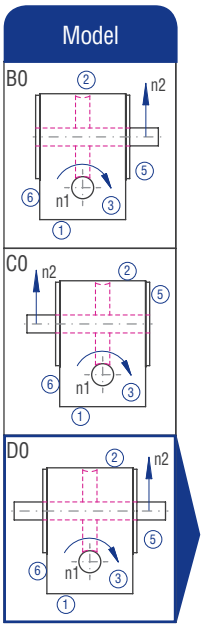
Inertia moment J_1 related to the fast-rotating shaft (N_1)

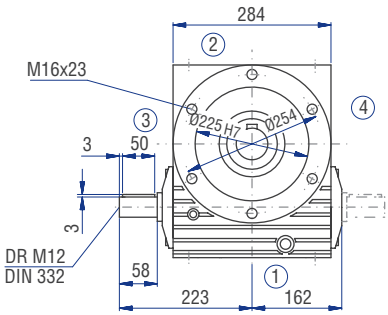
	Inertia moment [kgcm²]											
	5:1	7.5:1	10:1	13:1	15:1	20:1	26:1	30:1	40:1	53:1	62:1	83:1
J1	41.77	35.71	26.58	22.54	32.07	23.93	20.71	31.17	23.26	20.25	25.06	21.04

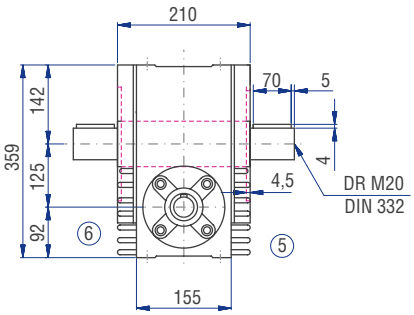
The mass of the gearbox may deviate depending on the gear ratio and the type.

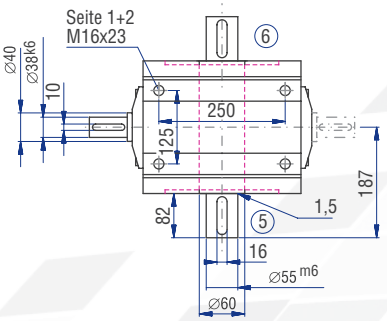
Mass ca. [kg]
80



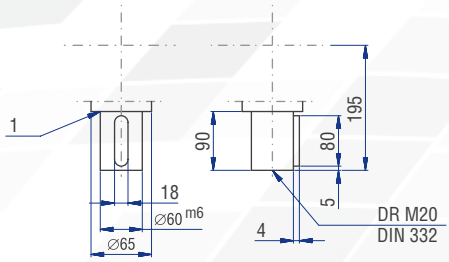


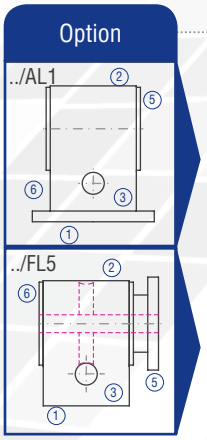


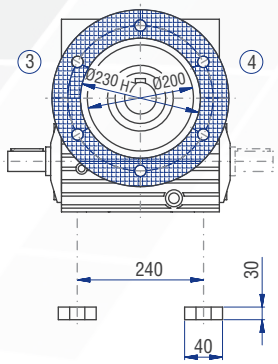


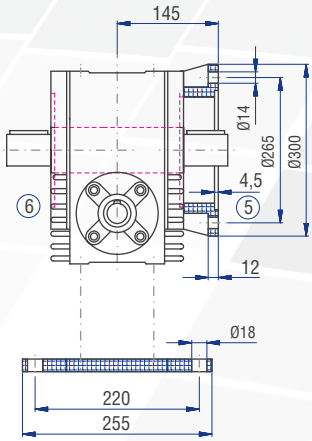


Implementation VV

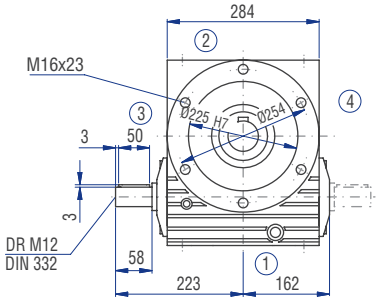


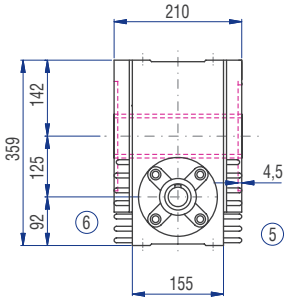


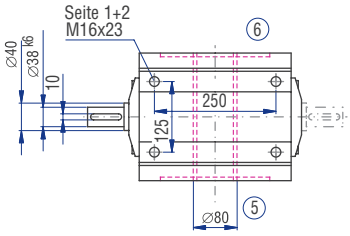




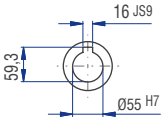
The dimensions of the Models not shown can be figured by mirroring available dimensions.



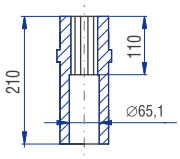


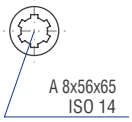


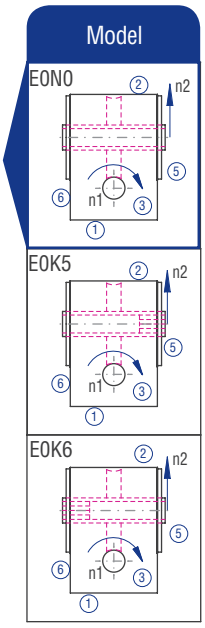
E0N0

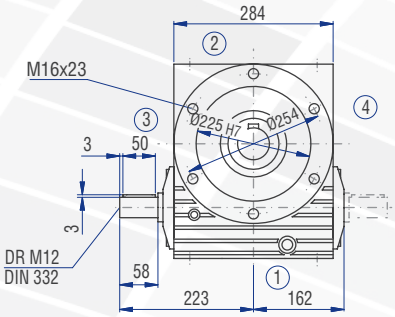


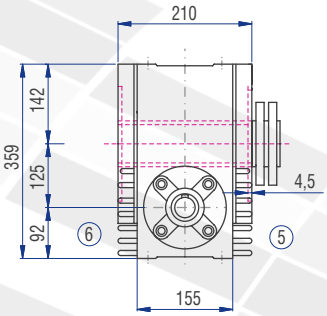
E0K5 / E0K6

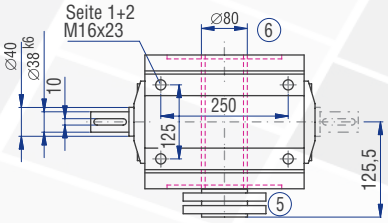


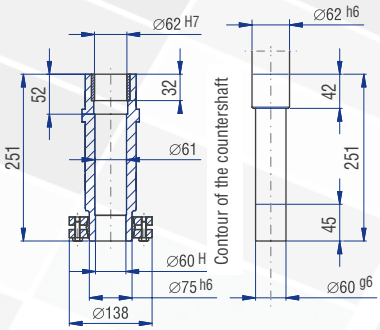


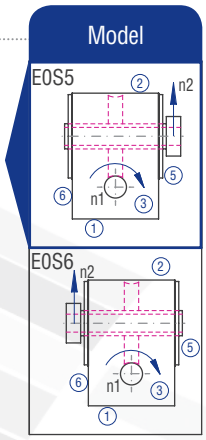




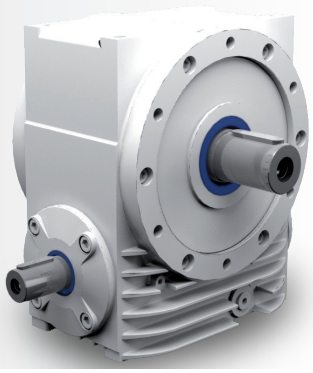








9.3.12 Type S 160 – Standard worm gearboxes



Characteristics

Characteristic	Standard	Option
Toothing	Hardened and ground worm shaft / bronze worm gear	See chapter 9.2.1
Gear ratio	5:1 to 83:1	
Housing / Flanges	Grey cast iron	
Threaded mounting hole	On gearbox sides 1, 2 and on the flanges	See chapter 9.2.3
Shaft	Material 1 C45, shaft ends greased Fit with ISO j6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	Material: GGG grey cast iron; shafts greased Fit with ISO H7 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.3
Radial shaft seal ring	NBR, form A	See chapter 4.8
Ambient temperature	- 10°C to +90°C. The values of the performance tables are valid for 20°C	See chapter 4.9.3
Circumferential backlash	< 30 arcmin	See chapter 9.2.10
Protection class	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness > 40 µm	See chapter 4.4
Bearing life L10h	more than 15,000h	See chapter 4.9.1
Oil change intervals	Not required if the oil temperature is kept < 90°C The lifetime of the bearings can be increased by the factor 1.5 if the oil is changed after the first 500 service hours and then every 5000 service hours.	See chapter 9.2.8
Lubricant	Synthetic lubricants	See chapter 9.2.8

Performance data

i	i ist		n_1 [rpm]					
			3000	1500	1000	750	500	150
5:1	30:6	n_2 [rpm]		300.0	200.0	150.0	100.0	30.0
		P_{1N} [kW]		53.11	40.37	33.38	24.58	9.96
		T_{2N} [Nm]		1,640	1,870	2,040	2,230	2,950
		P_{1NT} [kW]		25.20	23.42	21.89	19.33	0.00
		Efficiency		0.97	0.97	0.96	0.95	0.93
7.5:1	30:4	n_2 [rpm]	400.0	200.0	133.0	100.0	66.0	20.0
		P_{1N} [kW]	43.91	39.53	29.83	24.94	20.05	9.34
		T_{2N} [Nm]	996	1,793	2,051	2,263	2,729	4,013
		P_{1NT} [kW]	23.14	20.07	18.56	17.28	15.18	0.00
		Efficiency	0.95	0.95	0.96	0.95	0.95	0.90
10:1	40:4	n_2 [rpm]	300.0	150.0	100.0	75.0	50.0	15.0
		P_{1N} [kW]	51.25	32.26	24.59	20.28	15.60	6.98
		T_{2N} [Nm]	1,550	1,951	2,231	2,453	2,800	3,909
		P_{1NT} [kW]	22.09	18.76	17.04	15.66	13.57	0.00
		Efficiency	0.95	0.95	0.95	0.95	0.94	0.88
13:1	54:4	n_2 [rpm]	230.0	115.0	76.0	57.0	38.0	11.0
		P_{1N} [kW]	36.29	19.80	13.87	10.87	7.66	2.73
		T_{2N} [Nm]	1,466	1,600	1,681	1,738	1,810	2,041
		P_{1NT} [kW]	20.77	17.24	15.41	14.02	12.06	0.00
		Efficiency	0.94	0.94	0.94	0.93	0.92	0.87
15:1	30:2	n_2 [rpm]	200.0	100.0	66.0	50.0	33.0	10.0
		P_{1N} [kW]	29.82	22.42	18.10	16.22	12.88	6.17
		T_{2N} [Nm]	1,310	1,970	2,386	2,820	3,320	4,830
		P_{1NT} [kW]	14.64	12.55	11.55	10.73	9.40	0.00
		Efficiency	0.92	0.92	0.92	0.91	0.90	0.82
20:1	40:2	n_2 [rpm]	150.0	75.0	50.0	37.0	25.0	7.5
		P_{1N} [kW]	29.60	18.83	14.35	12.43	9.80	4.49
		T_{2N} [Nm]	1,715	2,158	2,467	2,850	3,294	4,576
		P_{1NT} [kW]	13.95	11.70	10.58	9.70	8.39	0.00
		Efficiency	0.91	0.90	0.90	0.90	0.88	0.80

i	i ist		n_1 [rpm]					
			3000	1500	1000	750	500	150
26:1	54:2	n_2 [rpm]	115.0	57.0	38.0	28.0	19.0	5.8
		P_{1N} [kW]	23.70	13.88	9.83	7.63	5.44	2.06
		T_{2N} [Nm]	1,813	2,124	2,231	2,307	2,413	2,727
		P_{1NT} [kW]	13.07	10.71	9.53	8.66	7.45	0.00
		Efficiency	0.89	0.89	0.88	0.88	0.86	0.77
30:1	30:1	n_2 [rpm]	100.0	50.0	33.0	25.0	16.0	5.0
		P_{1N} [kW]	20.44	13.53	11.13	9.85	8.02	3.41
		T_{2N} [Nm]	1,640	2,170	2,678	3,160	3,720	4,500
		P_{1NT} [kW]	8.79	7.39	6.79	6.31	5.57	0.00
		Efficiency	0.84	0.84	0.84	0.84	0.81	0.69
40:1	40:1	n_2 [rpm]	75.0	37.0	25.0	18.0	12.0	3.8
		P_{1N} [kW]	17.04	10.73	8.73	7.73	6.11	2.90
		T_{2N} [Nm]	1,801	2,267	2,735	3,190	3,688	4,952
		P_{1NT} [kW]	8.41	6.92	6.25	5.76	5.02	0.00
		Efficiency	0.83	0.83	0.82	0.81	0.79	0.67
53:1	54:1	n_2 [rpm]	57.0	28.0	18.0	14.0	9.4	2.8
		P_{1N} [kW]	13.62	8.52	6.05	4.81	3.50	1.40
		T_{2N} [Nm]	1,896	2,372	2,494	2,582	2,708	3,091
		P_{1NT} [kW]	7.93	6.39	5.69	5.19	4.52	0.00
		Efficiency	0.81	0.81	0.80	0.78	0.75	0.64
62:1	63:1	n_2 [rpm]	48.0	24.0	16.0	12.0	8.1	2.4
		P_{1N} [kW]	11.97	7.53	5.82	4.86	3.83	1.61
		T_{2N} [Nm]	1,800	2,266	2,591	2,848	3,225	3,552
		P_{1NT} [kW]	6.00	4.87	4.42	4.09	3.63	0.00
		Efficiency	0.75	0.75	0.74	0.73	0.70	0.55
83:1	84:1	n_2 [rpm]	36.0	18.0	12.0	9.0	6.0	1.8
		P_{1N} [kW]	9.76	6.10	4.18	3.18	2.25	0.74
		T_{2N} [Nm]	1,906	2,347	2,347	2,347	2,347	2,347
		P_{1NT} [kW]	5.72	4.55	4.07	3.74	3.31	0.00
		Efficiency	0.73	0.72	0.70	0.69	0.65	0.59

	5:1	7.5:1	10:1	13:1	15:1	20:1	26:1	30:1	40:1	53:1	62:1	83:1
T_{2max} [Nm]	4450	4450	4780	2410	4550	5050	3345	4500	5120	3700	3900	4050

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

n_1 [rpm]	3000		1500		1000		750		500		150	
T_1 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 200	2700	1350	3100	1550	3400	1700	3700	1850	4000	2000	4350	2175
> 200	2080	1040	2390	1195	2610	1305	2850	1425	3070	1535	3340	1670

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

n_2 [rpm]	200		125		75		50		30		10	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 2300	5600	2800	6800	3400	7600	3800	8600	4300	10200	5100	13600	6800
> 2300	4670	2335	5670	2835	6330	3165	7170	3585	8500	4250	11300	5650

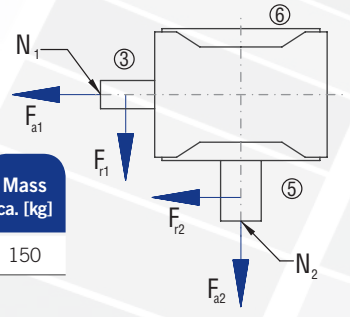
Inertia moments/mass

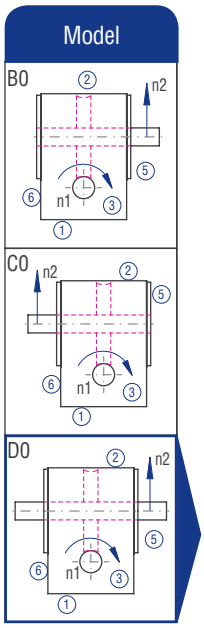
Inertia moment J_1 related to the fast-rotating shaft (N_1)

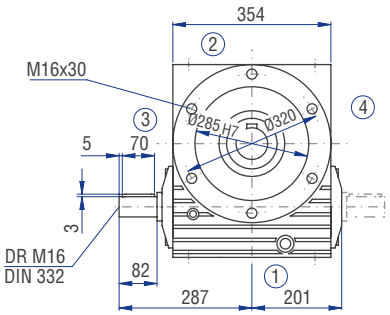
	Inertia moment [kgcm²]											
	5:1	7.5:1	10:1	13:1	15:1	20:1	26:1	30:1	40:1	53:1	62:1	83:1
J1	157.14	118.50	78.13	56.81	95.31	65.22	52.53	89.51	61.99	51.45	67.78	53.75

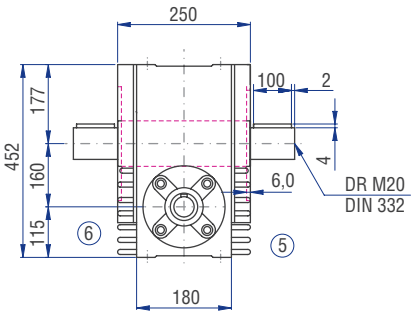
The mass of the gearbox may deviate depending on the gear ratio and the type.

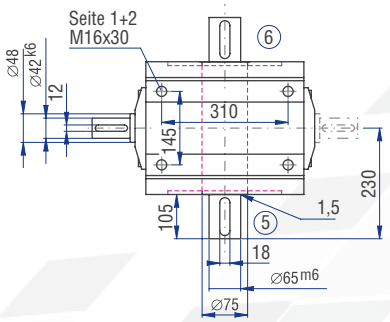
Mass ca. [kg]
150



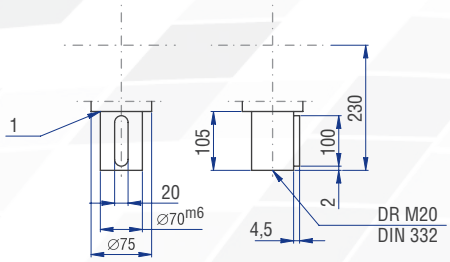


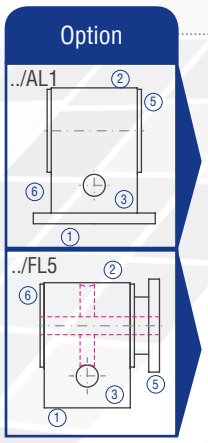


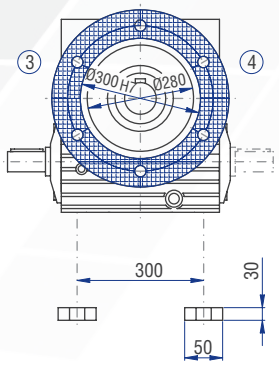


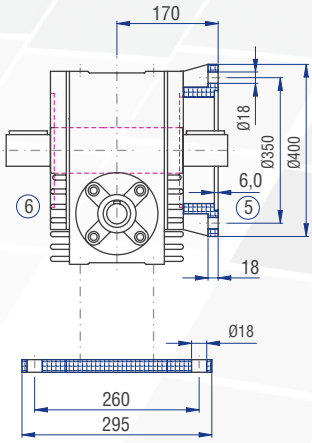


Implementation VV

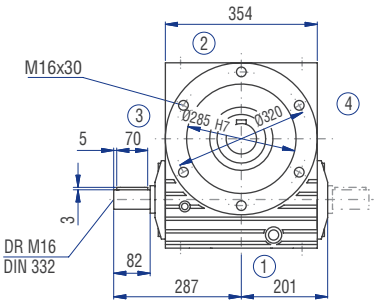


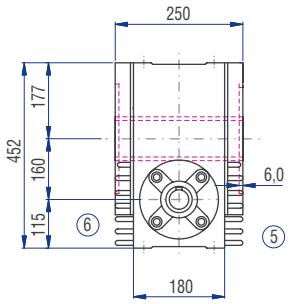


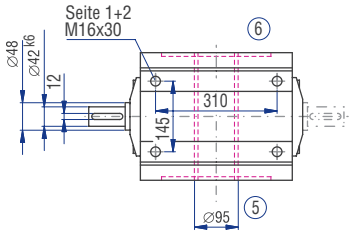




The dimensions of the Models not shown can be figured by mirroring available dimensions.







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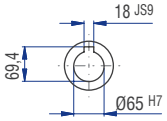
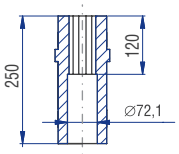
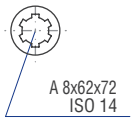
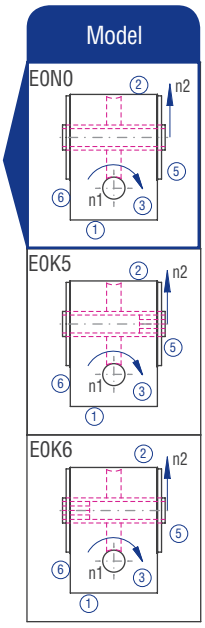
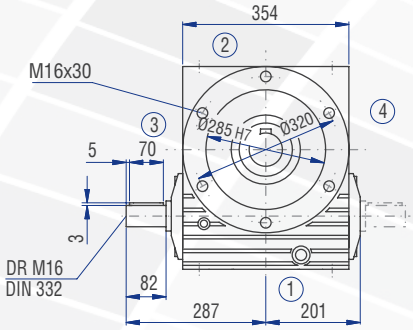


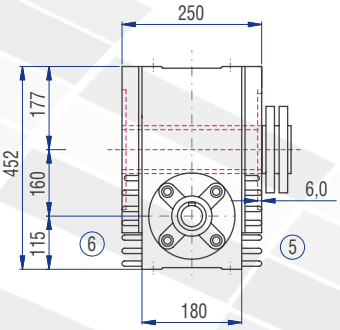
E0K5 / E0K6

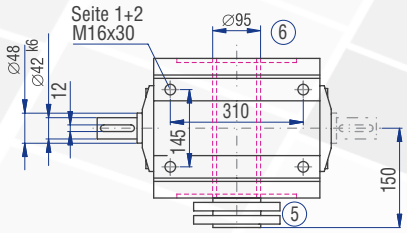


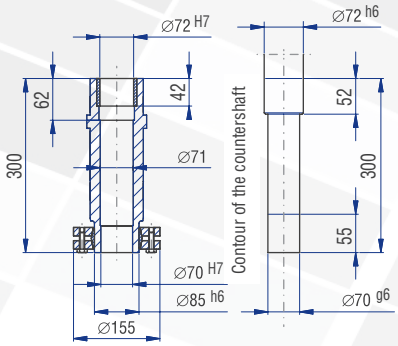


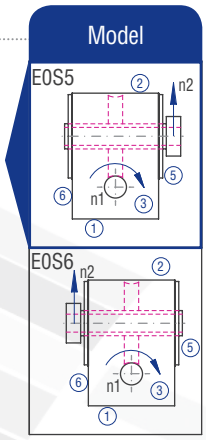




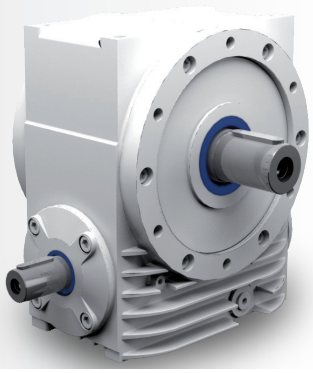








9.3.13 Type S 200 – Standard worm gearboxes



Characteristics

Characteristic	Standard	Option
Toothing	Hardened and ground worm shaft / bronze worm gear	See chapter 9.2.1
Gear ratio	5:1 to 83:1	
Housing / Flanges	Grey cast iron	
Threaded mounting hole	On gearbox sides 1, 2 and on the flanges	See chapter 9.2.3
Shaft	Material 1 C45, shaft ends greased Fit with ISO j6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	Material: GGG grey cast iron; shafts greased Fit with ISO H7 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.3
Radial shaft seal ring	NBR, form A	See chapter 4.8
Ambient temperature	- 10°C to +90°C. The values of the performance tables are valid for 20°C	See chapter 4.9.3
Circumferential backlash	< 30 arcmin	See chapter 9.2.10
Protection class	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness > 40 µm	See chapter 4.4
Bearing life L10h	more than 15,000h	See chapter 4.9.1
Oil change intervals	Not required if the oil temperature is kept < 90°C The lifetime of the bearings can be increased by the factor 1.5 if the oil is changed after the first 500 service hours and then every 5000 service hours.	See chapter 9.2.8
Lubricant	Synthetic lubricants	See chapter 9.2.8

Performance data

i	i ist		n_1 [rpm]					
			3000	1500	1000	750	500	150
5:1	30:6	n_2 [rpm]		300.0	200.0	150.0	100.0	30.0
		P_{1N} [kW]		84.20	64.77	55.30	41.45	18.05
		T_{2N} [Nm]		260	3,000	3,380	3,800	5,400
		P_{1NT} [kW]		41.80	40.25	38.36	34.49	0.00
		Efficiency		0.97	0.97	0.96	0.96	0.94
7.5:1	30:4	n_2 [rpm]		200.0	133.0	100.0	66.0	20.0
		P_{1N} [kW]		62.59	50.68	44.55	36.26	17.32
		T_{2N} [Nm]		2,869	3,485	4,084	4,987	7,607
		P_{1NT} [kW]		33.51	32.09	30.44	27.20	0.00
		Efficiency		0.96	0.96	0.96	0.96	0.92
10:1	40:4	n_2 [rpm]		150.0	100.0	75.0	50.0	15.0
		P_{1N} [kW]		50.86	38.38	32.92	26.73	12.45
		T_{2N} [Nm]		3,076	3,519	4,024	4,851	7,134
		P_{1NT} [kW]		30.91	29.22	27.42	24.16	0.00
		Efficiency		0.95	0.96	0.96	0.95	0.90
13:1	53:4	n_2 [rpm]	230.0	115.0	76.0	57.0	38.0	11.0
		P_{1N} [kW]	64.74	40.74	31.06	24.46	17.27	6.24
		T_{2N} [Nm]	2,594	3,265	3,734	3,921	4,109	4,633
		P_{1NT} [kW]	31.35	28.70	26.62	24.63	21.36	0.00
		Efficiency	0.95	0.95	0.95	0.95	0.94	0.88
15:1	30:2	n_2 [rpm]		100.0	66.0	50.0	33.0	10.0
		P_{1N} [kW]		39.27	32.34	28.88	23.23	11.50
		T_{2N} [Nm]		3,450	4,308	5,130	6,122	9,244
		P_{1NT} [kW]		20.99	20.00	18.92	16.85	0.00
		Efficiency		0.92	0.93	0.93	0.92	0.84
20:1	40:2	n_2 [rpm]	150.0	75.0	50.0	37.0	25.0	7.5
		P_{1N} [kW]	42.29	29.60	24.14	21.62	17.17	8.22
		T_{2N} [Nm]	2,450	3,430	4,241	5,010	5,902	8,587
		P_{1NT} [kW]	20.87	19.21	18.07	16.92	14.86	0.00
		Efficiency	0.91	0.91	0.92	0.91	0.90	0.82

i	i ist		n_1 [rpm]					
			3000	1500	1000	750	500	150
26:1	53:2	n_2 [rpm]	115.0	57.0	38.0	28.0	19.0	5.8
		P_{1N} [kW]	37.80	23.79	18.40	14.95	11.51	4.58
		T_{2N} [Nm]	2,870	3,612	4,190	4,540	5,184	6,177
		P_{1NT} [kW]	19.73	17.77	16.41	15.15	13.12	0.00
		Efficiency	0.90	0.90	0.90	0.90	0.89	0.80
30:1	30:1	n_2 [rpm]		50.0	33.0	25.0	16.0	5.0
		P_{1N} [kW]		23.74	19.73	17.62	14.33	7.43
		T_{2N} [Nm]		3,900	4,862	5,790	6,896	10,356
		P_{1NT} [kW]		12.29	11.65	11.03	9.86	0.00
		Efficiency		0.86	0.86	0.86	0.84	0.73
40:1	40:1	n_2 [rpm]	75.0	37.0	25.0	18.0	12.0	3.8
		P_{1N} [kW]	23.93	18.04	14.66	13.14	10.56	5.58
		T_{2N} [Nm]	2,560	3,860	4,761	5,620	6,613	9,942
		P_{1NT} [kW]	12.58	11.27	10.56	9.89	8.75	0.00
		Efficiency	0.84	0.84	0.85	0.84	0.82	0.70
53:1	53:1	n_2 [rpm]	57.0	28.0	18.0	14.0	9.4	2.8
		P_{1N} [kW]	21.71	13.99	11.19	9.40	6.79	3.09
		T_{2N} [Nm]	3,003	3,870	4,701	5,200	5,428	6,985
		P_{1NT} [kW]	11.96	10.48	9.65	8.93	7.81	0.00
		Efficiency	0.82	0.82	0.83	0.82	0.79	0.67
62:1	63:1	n_2 [rpm]	48.0	24.0	16.0	12.0	8.1	2.4
		P_{1N} [kW]	18.60	11.56	8.81	7.36	5.84	2.99
		T_{2N} [Nm]	2,835	3,569	4,081	4,488	5,128	6,946
		P_{1NT} [kW]	8.90	7.77	7.28	6.85	6.14	0.00
		Efficiency	0.76	0.77	0.77	0.76	0.73	0.58
83:1	83:1	n_2 [rpm]	36.0	18.0	12.0	9.0	6.0	1.8
		P_{1N} [kW]	15.43	9.58	7.31	6.06	4.21	1.61
		T_{2N} [Nm]	3,016	3,797	4,343	4,675	4,675	4,675
		P_{1NT} [kW]	8.61	7.38	6.80	6.34	5.62	0.00
		Efficiency	0.74	0.75	0.75	0.73	0.70	0.55

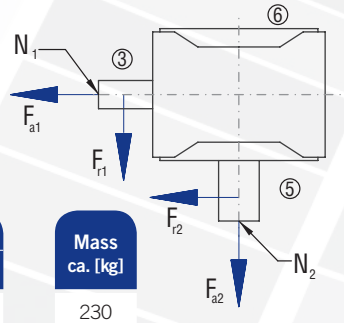
	5:1	7.5:1	10:1	13:1	15:1	20:1	26:1	30:1	40:1	53:1	62:1	83:1
T_{2max} [Nm]	8500	9800	9277	5396	10500	10000	6790	10500	9800	7500	7000	6800

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

n_1 [rpm]	3000		1500		1000		750		500		150	
T_1 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 350	3600	1800	3950	1975	4320	2160	4700	2350	5100	2550	5600	2800
> 350	2770	1385	3040	1520	3320	1660	3600	1800	3900	1950	4300	2150

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

n_2 [rpm]	200		125		75		50		30		10	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 5000	7500	3750	9300	4650	10300	5150	11500	5750	13500	6750	18000	9000
> 5000	6600	3300	8100	4050	9000	4500	10000	5000	11700	5850	15700	7850



Inertia moments/mass

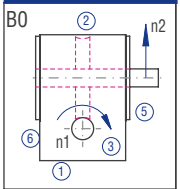
Inertia moment J_1 related to the fast-rotating shaft (N_1)

	Inertia moment [kgcm²]											Mass ca. [kg]
	5:1	7.5:1	10:1	13:1	15:1	20:1	26:1	30:1	40:1	53:1	62:1	83:1	
J1	423.35	297.53	205.31	147.30	222.04	159.87	121.61	203.16	148.51	115.11	167.32	121.89	230

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

Model

B0



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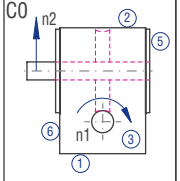

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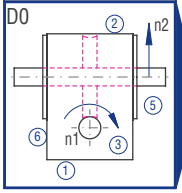
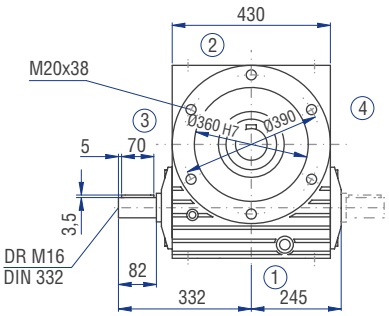
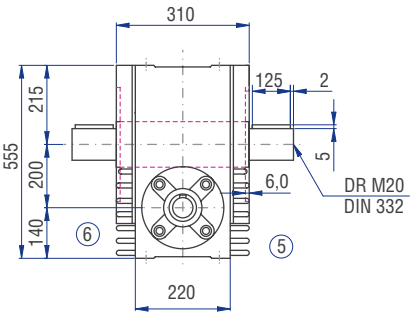
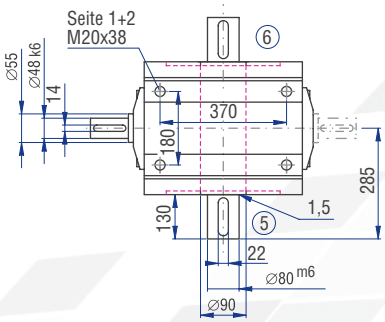
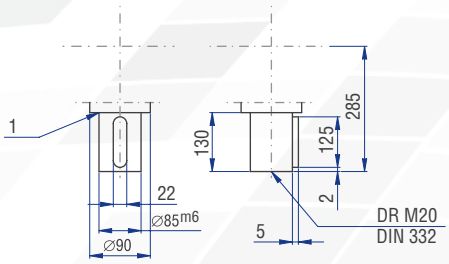






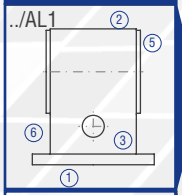


Implementation VV



Option

../AL1



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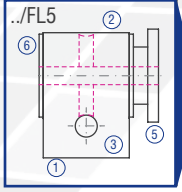
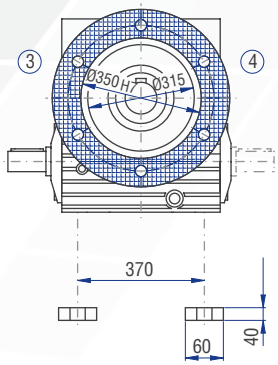
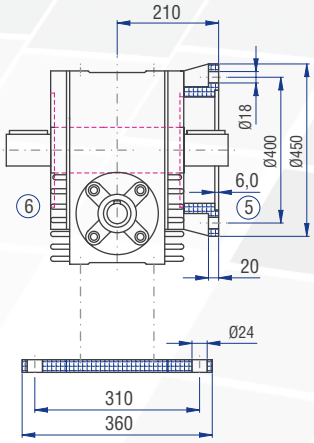
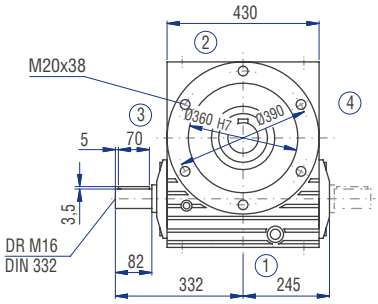
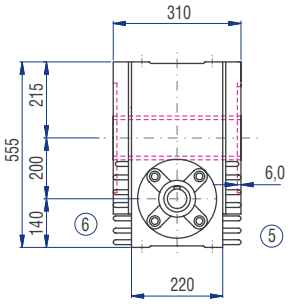


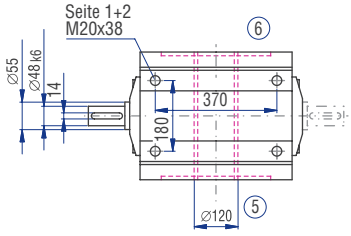




The dimensions of the Models not shown can be figured by mirroring available dimensions.







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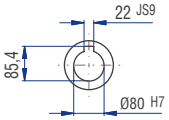

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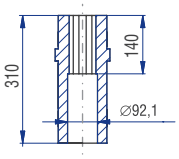
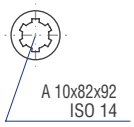
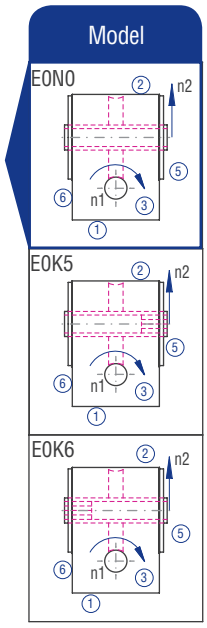
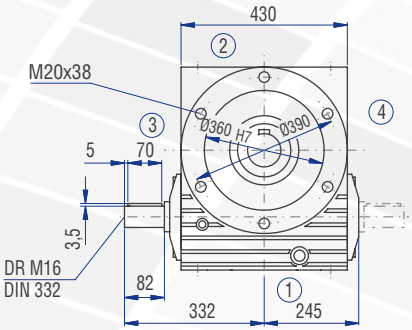
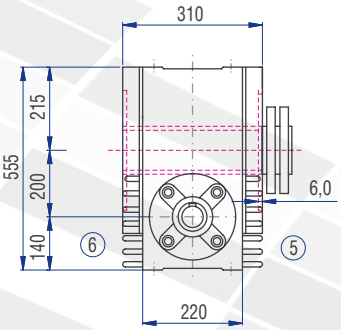
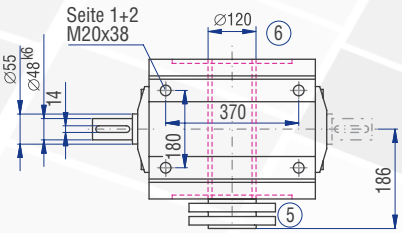


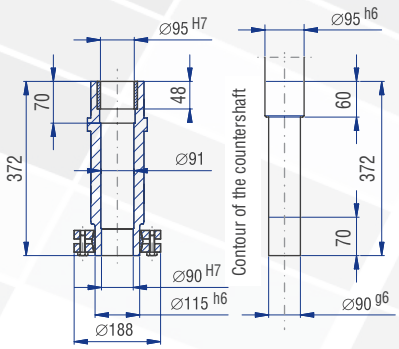


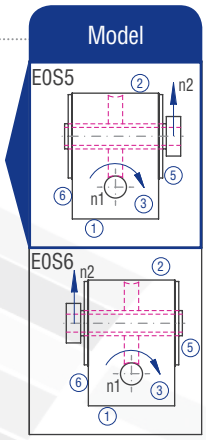




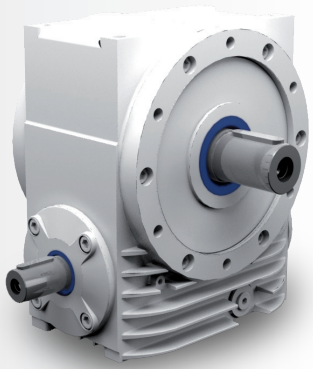








9.3.14 Type S 250 – Standard worm gearboxes



Characteristics

Characteristic	Standard	Option
Toothing	Hardened and ground worm shaft / bronze worm gear	See chapter 9.2.1
Gear ratio	7.5:1 to 83:1	
Housing / Flanges	Grey cast iron	
Threaded mounting hole	On gearbox sides 1, 2 and on the flanges	See chapter 9.2.3
Shaft	Material 1 C45, shaft ends greased Fit with ISO j6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	Material: GGG grey cast iron; shafts greased Fit with ISO H7 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.3
Radial shaft seal ring	NBR, form A	See chapter 4.8
Ambient temperature	- 10°C to +90°C. The values of the performance tables are valid for 20°C	See chapter 4.9.3
Circumferential backlash	< 30 arcmin	See chapter 9.2.10
Protection class	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness > 40 µm	See chapter 4.4
Bearing life L10h	more than 15,000h	See chapter 4.9.1
Oil change intervals	Not required if the oil temperature is kept < 90°C The lifetime of the bearings can be increased by the factor 1.5 if the oil is changed after the first 500 service hours and then every 5000 service hours.	See chapter 9.2.8
Lubricant	Synthetic lubricants	See chapter 9.2.8

Performance data

i	i ist		n_1 [rpm]				
			1500	1000	750	500	150
7.5:1	31:4	n_2 [rpm]	200.0	133.0	100.0	66.0	20.0
		P_{1N} [kW]	140.64	111.12	90.87	68.37	29.86
		T_{2N} [Nm]	6,514	7,720	8,418	9,500	13,260
		P_{1NT} [kW]	78.13	69.45	60.58	52.59	0.00
		Efficiency	0.97	0.97	0.97	0.97	0.93
10:1	40:4	n_2 [rpm]	150.0	100.0	75.0	50.0	15.0
		P_{1N} [kW]	118.29	89.06	72.81	54.79	54.79
		T_{2N} [Nm]	7,230	8,165	8,900	10,047	10,047
		P_{1NT} [kW]	73.93	68.51	60.67	49.81	0.00
		Efficiency	0.96	0.96	0.96	0.96	0.96
13:1	52:4	n_2 [rpm]	115.0	76.0	57.0	38.0	11.0
		P_{1N} [kW]	93.66	69.15	53.77	38.02	13.65
		T_{2N} [Nm]	7,585	8,400	8,709	9,140	10,360
		P_{1NT} [kW]	66.90	62.86	53.77	47.52	0.00
		Efficiency	0.96	0.96	0.96	0.95	0.90
15:1	31:2	n_2 [rpm]	100.0	66.0	50.0	33.0	10.0
		P_{1N} [kW]	74.97	59.15	48.35	36.78	15.39
		T_{2N} [Nm]	6,730	7,965	8,680	9,800	12,790
		P_{1NT} [kW]	41.65	36.97	32.23	26.27	0.00
		Efficiency	0.94	0.94	0.94	0.93	0.87
20:1	40:2	n_2 [rpm]	75.0	50.0	37.0	25.0	7.5
		P_{1N} [kW]	62.89	47.35	38.71	29.46	12.68
		T_{2N} [Nm]	7,447	8,410	9,168	10,352	13,720
		P_{1NT} [kW]	41.92	36.42	29.78	26.78	0.00
		Efficiency	0.93	0.93	0.93	0.92	0.85

i	i ist		n_1 [rpm]				
			1500	1000	750	500	150
26:1	52:2	n_2 [rpm]	57.0	38.0	28.0	19.0	5.8
		P_{1N} [kW]	50.28	37.84	30.92	23.54	9.92
		T_{2N} [Nm]	7,805	8,810	9,600	10,844	13,720
		P_{1NT} [kW]	36.68	34.40	30.92	29.43	0.00
		Efficiency	0.92	0.92	0.92	0.91	0.82
30:1	31:1	n_2 [rpm]	50.0	33.0	25.0	16.0	5.0
		P_{1N} [kW]	40.69	31.89	26.06	19.84	8.65
		T_{2N} [Nm]	6,840	8,040	8,760	9,891	12,727
		P_{1NT} [kW]	20.35	19.93	16.29	14.17	0.00
		Efficiency	0.88	0.88	0.88	0.87	0.77
40:1	40:1	n_2 [rpm]	37.0	25.0	18.0	12.0	3.8
		P_{1N} [kW]	33.90	25.52	20.87	16.08	7.29
		T_{2N} [Nm]	7,510	8,480	9,250	10,445	13,720
		P_{1NT} [kW]	24.21	23.20	18.98	17.87	0.00
		Efficiency	0.87	0.87	0.87	0.85	0.74
53:1	52:1	n_2 [rpm]	28.0	18.0	14.0	9.4	2.8
		P_{1N} [kW]	27.44	20.64	16.88	13.01	5.81
		T_{2N} [Nm]	7,870	8,881	9,685	10,935	13,720
		P_{1NT} [kW]	18.29	15.88	16.88	13.01	0.00
		Efficiency	0.85	0.85	0.85	0.83	0.70
62:1	61:1	n_2 [rpm]	24.0	16.0	12.0	8.1	2.4
		P_{1N} [kW]	21.87	17.23	14.09	10.88	5.14
		T_{2N} [Nm]	6,819	8,060	8,787	9,918	12,581
		P_{1NT} [kW]	14.58	13.25	14.09	10.88	0.00
		Efficiency	0.79	0.79	0.79	0.77	0.62
83:1	83:1	n_2 [rpm]	18.0	12.0	9.0	6.0	1.8
		P_{1N} [kW]	18.60	14.18	11.25	7.80	2.94
		T_{2N} [Nm]	7,765	8,770	9,155	9,155	9,155
		P_{1NT} [kW]	14.31	14.18	11.25	9.75	0.00
		Efficiency	0.79	0.78	0.77	0.74	0.59

	7.5:1	10:1	13:1	15:1	20:1	26:1	30:1	40:1	53:1	62:1	83:1
T_{2max} [Nm]	13720	13720	10460	13720	13720	13720	13720	13720	13720	13720	13720

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

n_1 [rpm]	3000		1500		1000		750		500		150	
T_1 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
u.r.	u.r.	u.r.	u.r.	u.r.	u.r.	u.r.	u.r.	u.r.	u.r.	u.r.	u.r.	u.r.

u.r. – upon request

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

n_2 [rpm]	200		125		75		50		30		10	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
u.r.	u.r.	u.r.	u.r.	u.r.	u.r.	u.r.	u.r.	u.r.	u.r.	u.r.	u.r.	u.r.

u.r. – upon request

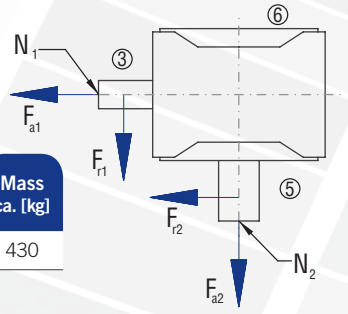
Inertia moments/mass

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

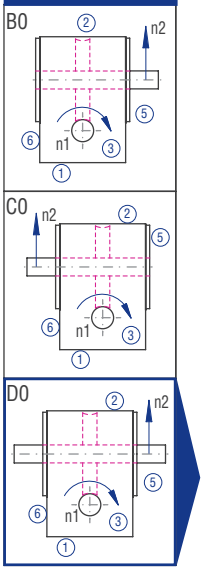
	Inertia moment [kgcm^2]										
	7.5:1	10:1	13:1	15:1	20:1	26:1	30:1	40:1	53:1	62:1	83:1
J1	551.70	338.70	233.60	365.20	241.20	182.20	318.60	216.80	169.30	259.50	258.30

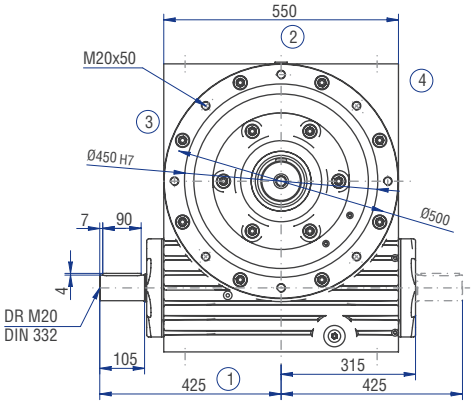
The mass of the gearbox may deviate depending on the gear ratio and the type.

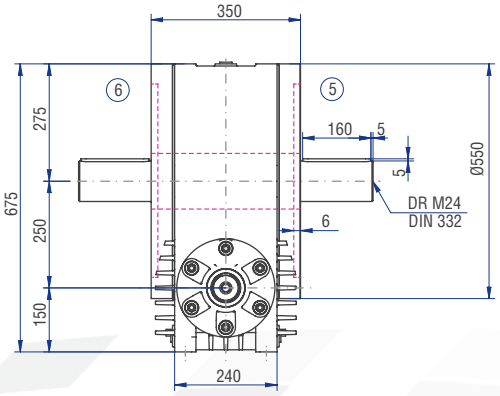
Mass ca. [kg]
430

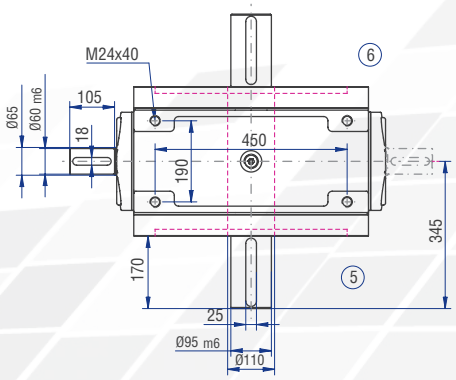


Model

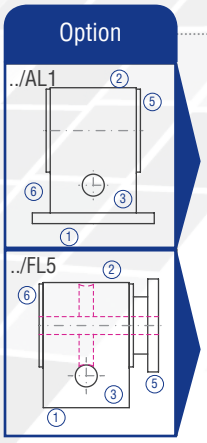


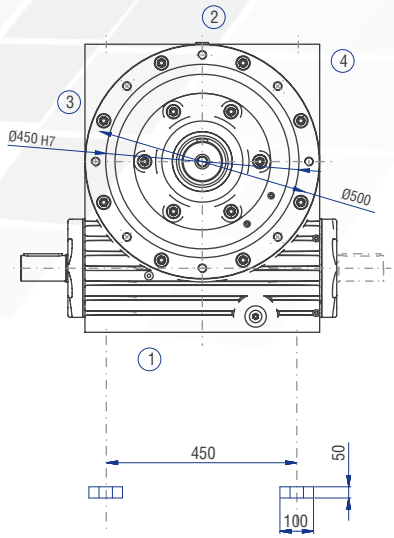


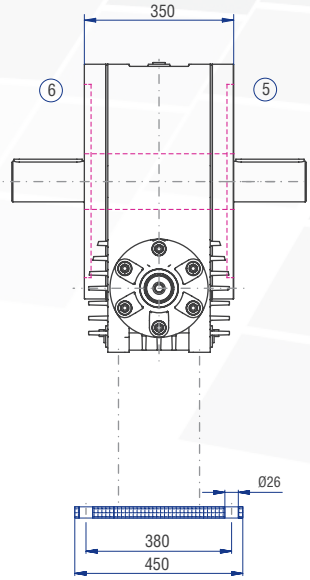




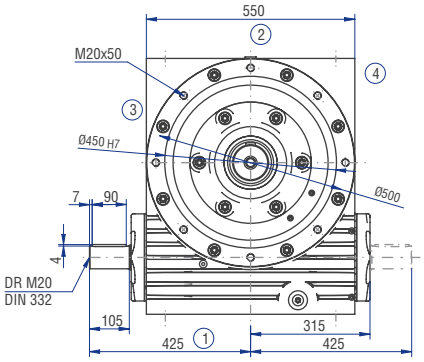
Option

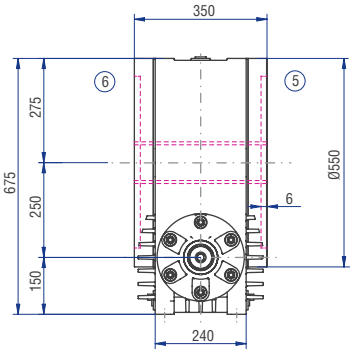






The dimensions of the Models not shown can be figured by mirroring available dimensions.





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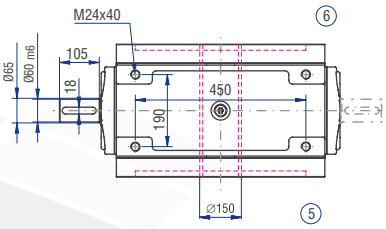
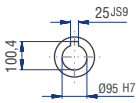
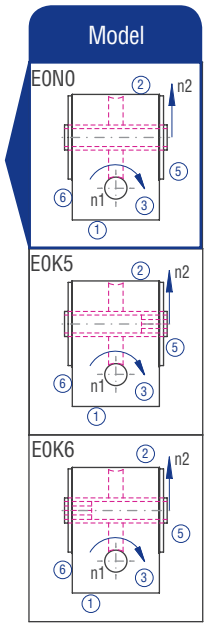
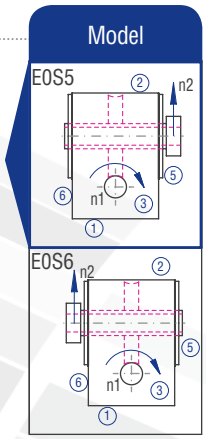






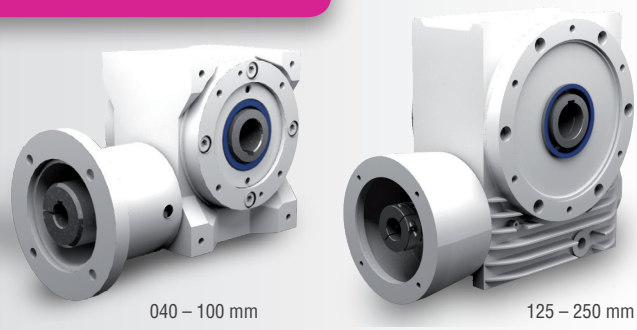
upon request



9.4 Type SL – Type S with flange for motor mounting

9.4.1 Features

Nominal gear ratios: i = 05:1 to 83:1
Maximum output torque: 13,720 Nm
9 sizes, centre-to-centre distance of 040 to 250 mm
Low-backlash construction < 6 angular minutes possible
Suitable for fitting IEC standard motors
Drive side with hollow-bored shaft and flange
Housing made of grey cast iron



9.4.2 Models

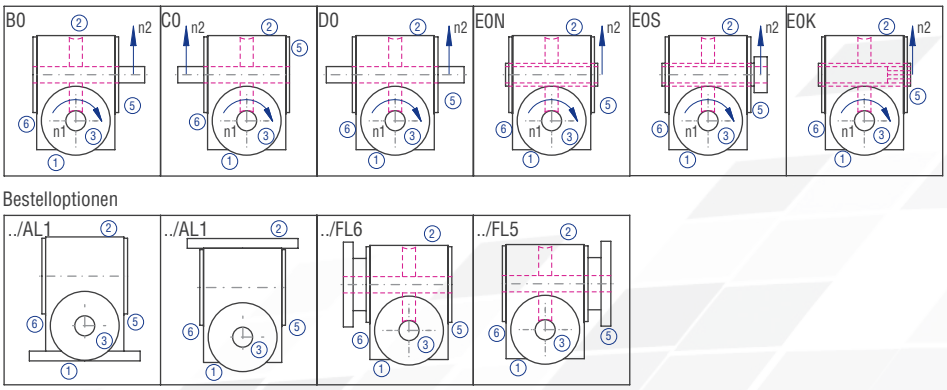


Figure **9.4.2-1; Models**

9.4.3 Gearbox sides

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

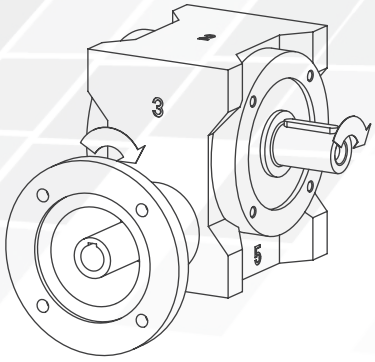


Figure **9.4.3-1; Gearbox sides**

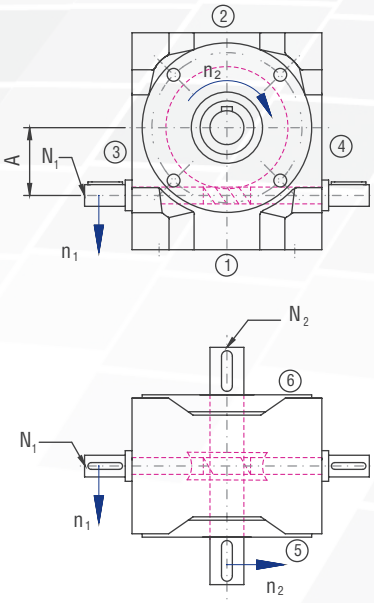


Figure **9.4.3-2; Shaft designations**

9.4.4 Order code

The order code reflects the customer specifications. Example:

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

Table **9.4.4-1**

9.4.5 Overview of performance data

Größe	n_1 [1/min]	5:1					7,5:1					10:1					13:1				
		n_2 [1/min]	P_{1N} [kW]	T_{2N} [Nm]	P_{1NT} [kW]	η	n_2 [1/min]	P_{1N} [kW]	T_{2N} [Nm]	P_{1NT} [kW]	η	n_2 [1/min]	P_{1N} [kW]	T_{2N} [Nm]	P_{1NT} [kW]	η	n_2 [1/min]	P_{1N} [kW]	T_{2N} [Nm]	P_{1NT} [kW]	η
040	3000	600,0	2,26	33	1,85	0,94	400,0	1,68	36	1,45	0,92	300,0	1,39	39	1,28	0,91	230,0	0,85	31	1,13	0,88
	1500	300,0	1,43	41	1,25	0,94	200,0	1,06	45	0,95	0,91	150,0	0,77	43	0,83	0,90	115,0	0,45	32	0,75	0,87
	1000	200,0	1,09	47	1,10	0,93	133,0	0,81	51	0,77	0,90	100,0	0,55	45	0,69	0,88	76,0	0,32	34	0,63	0,85
	750	150,0	0,87	49	0,90	0,87	100,0	0,65	54	0,70	0,89	75,0	0,43	47	0,63	0,87	57,0	0,26	36	0,57	0,84
	500	100,0	0,64	53	0,80	0,90	66,0	0,48	58	0,61	0,87	50,0	0,32	50	0,87	0,85	38,0	0,19	39	0,52	0,83
	150	30,0	0,25	67	0,00	0,86	20,0	0,19	73	0,00	0,82	15,0	0,13	64	0,00	0,81	11,0	0,08	50	0,00	0,80
050	3000	600,0	4,74	70	3,90	0,96	400,0	3,41	74	3,16	0,94	300,0	3,02	85	2,82	0,93	230,0	1,51	55	2,51	0,90
	1500	300,0	3,29	96	2,76	0,95	200,0	2,42	104	2,12	0,93	150,0	1,64	91	1,88	0,92	115,0	0,82	59	1,67	0,89
	1000	200,0	2,54	110	2,10	0,94	133,0	1,84	117	1,76	0,92	100,0	1,15	94	1,56	0,90	76,0	0,58	62	0,14	0,88
	750	150,0	2,08	119	2,04	0,93	100,0	1,43	120	1,57	0,91	75,0	0,96	103	1,40	0,89	57,0	0,45	64	1,27	0,87
	500	100,0	1,47	125	1,76	0,92	66,0	1,01	125	1,36	0,89	50,0	0,71	112	1,23	0,87	38,0	0,32	66	1,13	0,85
	150	30,0	0,54	145	0,00	0,88	20,0	0,40	153	0,00	0,83	15,0	0,26	130	0,00	0,82	11,0	0,12	75	0,00	0,80
063	3000	600,0	6,37	94	5,80	0,96	400,0	4,89	106	4,63	0,94	300,0	4,15	121	4,16	0,94	230,0	3,31	125	3,68	0,93
	1500	300,0	4,96	145	4,25	0,95	200,0	3,62	157	3,26	0,94	150,0	2,94	170	2,89	0,93	115,0	1,81	135	2,53	0,92
	1000	200,0	3,77	165	3,56	0,95	133,0	2,78	179	2,72	0,93	100,0	2,26	194	2,41	0,92	76,0	1,29	141	2,12	0,90
	750	150,0	3,11	180	3,15	0,94	100,0	2,37	201	2,41	0,92	75,0	1,83	207	2,15	0,91	57,0	1,00	145	1,90	0,89
	500	100,0	2,31	198	2,67	0,93	66,0	1,79	223	2,06	0,90	50,0	1,30	216	1,86	0,89	38,0	0,71	151	1,66	0,87
	150	30,0	0,91	247	0,00	0,88	20,0	0,72	280	0,00	0,84	15,0	0,51	265	0,00	0,83	11,0	0,26	170	0,00	0,82
080	3000	600,0	11,13	170	8,62	0,96	400,0	8,64	196	6,69	0,95	300,0	6,58	197	5,92	0,94	230,0	4,41	173	5,27	0,93
	1500	300,0	8,18	250	6,68	0,96	200,0	6,37	289	5,14	0,95	150,0	4,96	297	4,47	0,94	115,0	2,41	187	3,91	0,92
	1000	200,0	4,36	298	5,70	0,95	133,0	5,01	341	4,37	0,95	100,0	3,79	340	3,79	0,94	76,0	1,70	196	3,32	0,91
	750	150,0	5,55	332	5,05	0,94	100,0	4,36	391	3,88	0,94	75,0	3,15	373	3,36	0,93	57,0	1,33	202	2,96	0,90
	500	100,0	4,01	360	4,24	0,94	66,0	3,33	439	3,27	0,92	50,0	2,35	408	2,86	0,91	38,0	0,94	210	2,56	0,88
	150	30,0	1,58	448	0,00	0,89	20,0	1,39	569	0,00	0,86	15,0	0,96	513	0,00	0,84	11,0	0,34	236	0,00	0,83
100	3000	600,0	29,45	450	11,30	0,96	400,0	22,62	513	9,06	0,95	300,0	18,55	555	8,57	0,94	230,0	11,09	427	7,87	0,93
	1500	300,0	19,31	590	8,60	0,96	200,0	14,33	650	6,85	0,95	150,0	11,75	703	6,35	0,94	115,0	6,09	464	5,73	0,92
	1000	200,0	14,99	680	7,55	0,95	133,0	10,92	743	5,99	0,95	100,0	8,95	803	5,49	0,94	76,0	4,30	486	4,92	0,91
	750	150,0	12,45	745	6,87	0,94	100,0	9,10	817	5,43	0,94	75,0	7,45	882	4,95	0,93	57,0	3,37	502	4,43	0,90
	500	100,0	9,47	850	5,96	0,94	66,0	7,00	932	4,71	0,93	50,0	5,79	1006	4,30	0,91	38,0	2,37	523	3,85	0,89
	150	30,0	4,01	1150	0,00	0,90	20,0	3,03	1258	0,00	0,87	15,0	2,02	1095	0,00	0,85	11,0	0,85	586	0,00	0,83
125	3000	600,0	42,41	626	17,93	0,96	400,0	35,71	738	14,40	0,95	300,0	28,41	850	13,62	0,94	230,0	18,19	700	12,83	0,93
	1500	300,0	30,32	895	14,48	0,96	200,0	22,49	986	11,53	0,95	150,0	17,86	1069	10,68	0,94	115,0	10,02	763	9,84	0,92
	1000	200,0	23,15	1025	13,01	0,96	133,0	17,13	1127	10,31	0,95	100,0	13,61	1222	9,41	0,94	76,0	7,00	800	8,56	0,92
	750	150,0	19,34	1130	11,94	0,95	100,0	14,13	1239	9,44	0,95	75,0	11,22	1343	8,54	0,94	57,0	5,42	826	7,72	0,92
	500	100,0	14,72	1290	10,40	0,95	66,0	11,03	1436	8,20	0,94	50,0	8,62	1532	7,37	0,93	38,0	3,86	862	6,65	0,90
	150	30,0	6,29	1760	0,00	0,91	20,0	4,96	2016	0,00	0,88	15,0	3,78	2092	0,00	0,87	11,0	1,37	966	0,00	0,85
160	3000						400,0	43,91	996	23,14	0,95	300,0	51,25	1550	22,09	0,95	230,0	36,29	1466	20,77	0,94
	1500	300,0	53,11	1640	25,20	0,97	200,0	39,53	1793	20,07	0,95	150,0	32,26	1951	18,76	0,95	115,0	19,80	1600	17,24	0,94
	1000	200,0	40,37	1870	23,42	0,97	133,0	29,83	2051	18,56	0,96	100,0	24,59	2231	17,04	0,95	76,0	13,87	1681	15,41	0,94
	750	150,0	33,38	2040	21,89	0,96	100,0	24,94	2263	17,28	0,95	75,0	20,28	2453	15,66	0,95	57,0	10,87	1738	14,02	0,93
	500	100,0	24,58	2230	19,33	0,95	66,0	20,05	2729	15,18	0,95	50,0	15,60	2800	13,57	0,94	38,0	7,66	1810	12,06	0,92
	150	30,0	9,96	2950	0,00	0,93	20,0	9,34	4013	0,00	0,90	15,0	6,98	3909	0,00	0,88	11,0	2,73	2041	0,00	0,87
200	3000																230,0	64,74	2594	31,35	0,95
	1500	300,0	84,20	260	41,80	0,97	200,0	62,59	2869	33,51	0,96	150,0	50,86	3076	30,91	0,95	115,0	40,74	3265	28,70	0,95
	1000	200,0	64,77	3000	40,25	0,97	133,0	50,68	3485	32,09	0,96	100,0	38,38	3519	29,22	0,96	76,0	31,06	3734	26,62	0,95
	750	150,0	55,30	3380	38,36	0,96	100,0	44,55	4084	30,44	0,96	75,0	32,92	4024	27,42	0,96	57,0	24,46	3921	24,63	0,95
	500	100,0	41,45	3800	34,49	0,96	66,0	36,26	4987	27,20	0,96	50,0	26,73	4851	24,16	0,95	38,0	17,27	4109	21,36	0,94
	150	30,0	18,05	5400	0,00	0,94	20,0	17,32	7607	0,00	0,92	15,0	12,45	7134	0,00	0,90	11,0	6,24	4633	0,00	0,88
250	1500						200,0	140,64	6514	78,13	0,97	150,0	118,29	7230	73,93	0,96	115,0	93,66	7585	66,90	0,96
	1000						133,0	111,12	7720	69,45	0,97	100,0	89,06	8165	68,51	0,96	76,0	69,15	8400	62,86	0,96
	750						100,0	90,87	8418	60,58	0,97	75,0	72,81	8900	60,67	0,96	57,0	53,77	8709	53,77	0,96
	500						66,0	68,37	9500	52,59	0,97	50,0	54,79	10047	49,81	0,96	38,0	38,02	9140	47,52	0,95
	150						20,0	29,86	13260	0,00	0,93	15,0	54,79	10047	0,00	0,96	11,0	13,65	10360	0,00	0,90

Table **9.4.5-1**

9.4 Type SL – Type S with flange for motor mounting

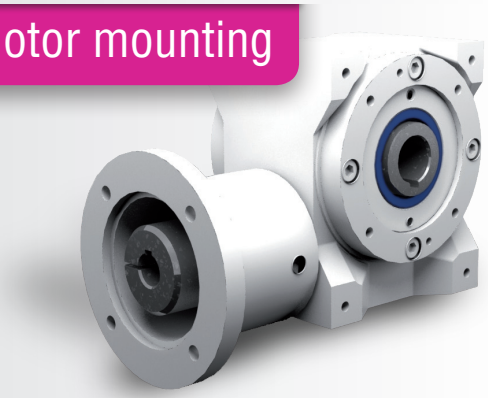
Größe	n_1 [1/min]	15:1					20:1					26:1					30:1				
		n_2 [1/min]	P_{1N} [kW]	T_{2N} [Nm]	P_{1NT} [kW]	η	n_2 [1/min]	P_{1N} [kW]	T_{2N} [Nm]	P_{1NT} [kW]	η	n_2 [1/min]	P_{1N} [kW]	T_{2N} [Nm]	P_{1NT} [kW]	η	n_2 [1/min]	P_{1N} [kW]	T_{2N} [Nm]	P_{1NT} [kW]	η
040	3000	200,0	0,93	37	0,85	0,86	150,0	0,82	43	0,77	0,84	115,0	0,55	36	0,68	0,80	100,0	0,53	36	0,51	0,75
	1500	100,0	0,60	48	0,55	0,84	75,0	0,49	50	0,49	0,82	57,0	0,30	38	0,44	0,78	50,0	0,37	50	0,33	0,73
	1000	66,0	0,48	55	0,46	0,82	50,0	0,36	53	0,42	0,80	38,0	0,21	40	0,38	0,76	33,0	0,29	57	0,28	0,70
	750	50,0	0,39	58	0,41	0,81	37,0	0,28	55	0,38	0,78	28,0	0,17	42	0,34	0,75	25,0	0,24	60	0,26	0,68
	500	33,0	0,29	63	0,36	0,78	25,0	0,21	58	0,34	0,76	19,0	0,12	45	0,31	0,73	16,0	0,18	65	0,23	0,64
	150	10,0	0,12	79	0,00	0,72	7,5	0,09	75	0,00	0,71	5,8	0,05	59	0,00	0,69	5,0	0,08	82	0,00	0,57
050	3000	200,0	1,82	74	1,91	0,88	150,0	1,54	81	1,70	0,87	115,0	1,04	71	1,51	0,84	100,0	1,12	82	1,14	0,79
	1500	100,0	1,32	106	1,27	0,87	75,0	1,03	106	1,12	0,85	57,0	0,58	76	1,00	0,81	50,0	0,79	113	0,76	0,77
	1000	66,0	1,02	120	1,05	0,85	50,0	0,73	110	0,93	0,83	38,0	0,42	80	0,84	0,79	33,0	0,59	121	0,63	0,74
	750	50,0	0,84	131	0,94	0,84	37,0	0,63	123	0,84	0,81	28,0	0,32	82	0,76	0,78	25,0	0,54	144	0,06	0,72
	500	33,0	0,65	145	0,82	0,81	25,0	0,47	133	0,74	0,78	19,0	0,24	86	0,68	0,75	16,0	0,42	157	0,50	0,68
	150	10,0	0,26	179	0,00	0,74	7,5	0,18	158	0,00	0,72	5,8	0,09	98	0,00	0,70	5,0	0,18	201	0,00	0,59
063	3000	200,0	3,12	128	2,80	0,89	150,0	2,95	161	2,52	0,88	115,0	1,89	132	2,21	0,86	100,0	1,94	143	1,66	0,80
	1500	100,0	2,23	183	1,95	0,00	75,0	1,70	186	1,73	0,88	57,0	1,25	173	1,52	0,85	50,0	1,38	204	1,15	0,80
	1000	66,0	1,77	213	1,62	0,00	50,0	1,32	212	1,44	0,86	38,0	0,90	181	1,27	0,83	33,0	1,11	237	0,97	0,77
	750	50,0	1,51	240	1,44	0,86	37,0	1,14	237	1,29	0,84	28,0	0,71	187	1,14	0,81	25,0	0,97	268	0,86	0,75
	500	33,0	1,16	266	1,23	0,83	25,0	0,86	259	1,12	0,81	19,0	0,51	195	1,01	0,78	16,0	0,75	296	0,75	0,71
	150	10,0	0,48	333	0,00	0,75	7,5	0,34	310	0,00	0,74	5,8	0,19	222	0,00	0,71	5,0	0,36	403	0,00	0,61
080	3000	200,0	5,61	241	4,08	0,90	150,0	4,24	240	3,59	0,89	115,0	2,83	210	3,19	0,88	100,0	3,47	272	2,41	0,82
	1500	100,0	4,10	352	3,09	0,90	75,0	3,04	344	2,67	0,89	57,0	1,67	245	2,34	0,87	50,0	2,52	395	1,81	0,82
	1000	66,0	3,26	415	2,62	0,89	50,0	2,37	399	2,26	0,88	38,0	1,19	256	1,99	0,85	33,0	2,03	456	1,54	0,80
	750	50,0	2,81	473	2,32	0,88	37,0	2,05	450	2,01	0,86	28,0	0,94	264	1,78	0,83	25,0	1,78	530	1,38	0,78
	500	33,0	2,18	530	1,97	0,85	25,0	1,57	498	1,72	0,83	19,0	0,68	275	1,55	0,80	16,0	1,38	593	1,18	0,75
	150	10,0	0,93	681	0,00	0,77	7,5	0,64	615	0,00	0,75	5,8	0,25	312	0,00	0,73	5,0	0,63	760	0,00	0,63
100	3000	200,0	13,12	564	5,76	0,90	150,0	10,84	614	5,44	0,89	115,0	7,63	556	4,94	0,88	100,0	7,53	590	3,50	0,82
	1500	100,0	8,32	715	4,31	0,90	75,0	6,87	778	3,99	0,89	57,0	4,20	605	3,57	0,87	50,0	4,78	748	2,60	0,82
	1000	66,0	6,41	817	3,75	0,89	50,0	5,28	888	3,44	0,88	38,0	3,00	634	3,06	0,85	33,0	3,60	825	2,27	0,80
	750	50,0	5,34	898	3,40	0,88	37,0	4,45	975	3,10	0,86	28,0	2,38	655	2,75	0,83	25,0	3,19	950	2,06	0,78
	500	33,0	4,16	1025	2,95	0,86	25,0	3,47	1112	2,69	0,84	19,0	1,72	683	2,40	0,80	16,0	2,51	1080	1,81	0,75
	150	10,0	1,88	1386	0,00	0,77	7,5	1,49	1441	0,00	0,76	5,8	0,64	773	0,00	0,73	5,0	1,18	1437	0,00	0,64
125	3000	200,0	20,06	862	9,13	0,90	150,0	16,59	940	8,61	0,89	115,0	12,76	929	8,09	0,88	100,0	11,76	901	5,50	0,83
	1500	100,0	12,61	1084	7,24	0,90	75,0	10,44	1183	6,68	0,89	57,0	7,03	1012	6,14	0,87	50,0	7,49	1134	4,31	0,82
	1000	66,0	10,01	1290	6,44	0,90	50,0	7,95	1352	5,86	0,89	38,0	4,97	1062	5,32	0,86	33,0	6,38	1448	3,83	0,82
	750	50,0	8,88	1510	5,88	0,89	37,0	6,74	1510	5,31	0,88	28,0	3,90	1097	4,80	0,85	25,0	5,65	1690	3,51	0,81
	500	33,0	6,91	1743	5,10	0,88	25,0	5,23	1717	4,58	0,86	19,0	2,78	1146	4,14	0,83	16,0	4,52	1952	3,08	0,78
	150	10,0	3,21	2423	0,00	0,79	7,5	2,33	2310	0,00	0,78	5,8	1,04	1294	0,00	0,75	5,0	1,86	2270	0,00	0,66
160	3000	200,0	29,82	1310	14,64	0,92	150,0	29,60	1715	13,95	0,91	115,0	23,70	1813	13,07	0,89	100,0	20,44	1640	8,79	0,84
	1500	100,0	22,42	1970	12,55	0,92	75,0	18,83	2158	11,70	0,90	57,0	13,88	2124	10,71	0,89	50,0	13,53	2170	7,39	0,84
	1000	66,0	18,10	2386	11,55	0,92	50,0	14,35	2467	10,58	0,90	38,0	9,83	2231	9,53	0,88	33,0	11,13	2678	6,79	0,84
	750	50,0	16,22	2820	10,73	0,91	37,0	12,43	2850	9,70	0,90	28,0	7,63	2307	8,66	0,88	25,0	9,85	3160	6,31	0,84
	500	33,0	12,88	3320	9,40	0,90	25,0	9,80	3294	8,39	0,88	19,0	5,44	2413	7,45	0,86	16,0	8,02	3720	5,57	0,81
	150	10,0	6,17	4830	0,00	0,82	7,5	4,49	4576	0,00	0,80	5,8	2,06	2727	0,00	0,77	5,0	3,41	4500	0,00	0,69
200	3000	100,0	39,27	3450	20,99	0,92	75,0	29,60	3430	19,21	0,91	57,0	23,79	3612	17,77	0,90	50,0	23,74	3900	12,29	0,86
	1500	66,0	32,34	4308	20,00	0,93	50,0	24,14	4241	18,07	0,92	38,0	18,40	4190	16,41	0,90	33,0	19,73	4862	11,65	0,86
	1000	50,0	28,88	5130	18,92	0,93	37,0	21,62	5010	16,92	0,91	28,0	14,95	4540	15,15	0,90	25,0	17,62	5790	11,03	0,86
	750	33,0	23,23	6122	16,85	0,92	25,0	17,17	5902	14,86	0,90	19,0	11,51	5184	13,12	0,89	16,0	14,33	6896	9,86	0,84
	500	10,0	11,50	9244	0,00	0,84	7,5	8,22	8587	0,00	0,82	5,8	4,58	6177	0,00	0,80	5,0	7,43	10356	0,00	0,73
	150	30,0	18,05	5400	0,00	0,94	20,0	17,32	7607	0,00	0,92	15,0	12,45	7134	0,00	0,90	11,0	6,24	4633	0,00	0,88
250	1500	100,0	74,97	6730	41,65	0,94	75,0	62,89	7447	41,92	0,93	57,0	50,28	7805	36,68	0,92	50,0	40,69	6840	20,35	0,88
	1000	66,0	59,15	7965	36,97	0,94	50,0	47,35	8410	36,42	0,93	38,0	37,84	8810	34,40	0,92	33,0	31,89	8040	19,93	0,88
	750	50,0	48,35	8680	32,23	0,94	37,0	38,71	9168	29,78	0,93	28,0	30,92	9600	30,92	0,92	25,0	26,06	8760	16,29	0,88
	500	33,0	36,78	9800	26,27	0,93	25,0	29,46	10352	26,78	0,92	19,0	23,54	10844	29,43	0,91	16,0	19,84	9891	14,17	0,87
	150	10,0	15,39	12790	0,00	0,87	7,5	12,68	13720	0,00	0,85	5,8	9,92	13720	0,00	0,82	5,0	8,65	12727	0,00	0,77

Table **9.4.5-1**

Größe	n_1 [1/min]	40:1					53:1					62:1					83:1				
		n_2 [1/min]	P_{1N} [kW]	T_{2N} [Nm]	P_{1NT} [kW]	η	n_2 [1/min]	P_{1N} [kW]	T_{2N} [Nm]	P_{1NT} [kW]	η	n_2 [1/min]	P_{1N} [kW]	T_{2N} [Nm]	P_{1NT} [kW]	η	n_2 [1/min]	P_{1N} [kW]	T_{2N} [Nm]	P_{1NT} [kW]	η
040	3000	75,0	0,48	44	0,46	0,72	57,0	0,39	44	0,42	0,68	48,0	0,36	45	0,35	0,63	36,0	0,25	36	0,32	0,56
	1500	37,0	0,32	56	0,30	0,70	28,0	0,21	46	0,28	0,65	24,0	0,20	48	0,23	0,59	18,0	0,14	37	0,21	0,52
	1000	25,0	0,25	63	0,25	0,67	18,0	0,15	48	0,24	0,63	16,0	0,15	51	0,20	0,56	12,0	0,10	38	0,18	0,50
	750	18,0	0,20	66	0,23	0,65	14,0	0,13	51	0,22	0,61	12,0	0,12	53	0,18	0,54	9,0	0,08	38	0,17	0,48
	500	12,0	0,15	71	0,21	0,62	9,4	0,09	55	0,20	0,59	8,1	0,09	56	0,16	0,51	6,0	0,05	38	0,15	0,46
	150	3,8	0,07	91	0,00	0,56	2,8	0,04	72	0,00	0,55	2,4	0,03	57	0,00	0,45	1,8	0,02	38	0,00	0,42
050	3000	75,0	0,87	80	1,02	0,76	57,0	0,65	77	0,92	0,73	48,0	0,61	81	0,75	0,67	36,0	0,39	59	0,70	0,58
	1500	37,0	0,65	118	0,68	0,75	28,0	0,38	85	0,62	0,69	24,0	0,42	105	0,50	0,64	18,0	0,21	63	0,47	0,56
	1000	25,0	0,52	134	0,57	0,71	18,0	0,27	88	0,52	0,67	16,0	0,31	109	0,43	0,60	12,0	0,15	64	0,41	0,54
	750	18,0	0,41	137	0,52	0,69	14,0	0,22	91	0,48	0,64	12,0	0,25	112	0,39	0,57	9,0	0,12	66	0,37	0,52
	500	12,0	0,31	147	0,46	0,65	9,4	0,16	95	0,43	0,61	8,1	0,18	113	0,36	0,53	6,0	0,09	69	0,34	0,49
	150	3,8	0,13	183	0,00	0,57	2,8	0,06	110	0,00	0,55	2,4	0,06	113	0,00	0,45	1,8	0,03	75	0,00	0,44
063	3000	75,0	1,54	149	1,50	0,78	57,0	1,16	143	1,34	0,76	48,0	0,82	110	1,10	0,69	36,0	0,75	129	0,99	0,66
	1500	37,0	1,08	207	1,04	0,77	28,0	0,80	191	0,96	0,74	24,0	0,66	175	0,76	0,68	18,0	0,46	152	0,69	0,63
	1000	25,0	0,85	237	0,87	0,75	18,0	0,58	200	0,78	0,71	16,0	0,53	202	0,65	0,65	12,0	0,33	152	0,59	0,59
	750	18,0	0,74	264	0,78	0,72	14,0	0,47	207	0,71	0,68	12,0	0,46	221	0,59	0,62	9,0	0,26	152	0,54	0,56
	500	12,0	0,57	288	0,69	0,68	9,4	0,34	217	0,63	0,65	8,1	0,34	226	0,52	0,57	6,0	0,19	152	0,49	0,52
	150	3,8	0,24	348	0,00	0,59	2,8	0,14	248	0,00	0,56	2,4	0,12	226	0,00	0,47	1,8	0,07	152	0,00	0,44
080	3000	75,0	2,62	267	2,14	0,80	57,0	1,78	234	1,93	0,78	48,0	1,40	194	1,55	0,70	36,0	1,10	196	1,43	0,68
	1500	37,0	1,87	381	1,58	0,80	28,0	1,04	271	1,41	0,77	24,0	1,01	279	1,15	0,70	18,0	0,90	304	1,04	0,65
	1000	25,0	1,49	443	1,35	0,78	18,0	0,76	284	1,20	0,74	16,0	0,81	325	0,98	0,68	12,0	0,64	304	0,90	0,61
	750	18,0	1,31	501	1,21	0,75	14,0	0,61	294	1,09	0,71	12,0	0,69	352	0,89	0,65	9,0	0,49	304	0,82	0,59
	500	12,0	1,02	553	1,05	0,71	9,4	0,45	308	0,96	0,68	8,1	0,54	393	0,78	0,61	6,0	0,35	304	0,73	0,55
	150	3,8	0,40	625	0,00	0,61	2,8	0,18	352	0,00	0,58	2,4	0,23	448	0,00	0,49	1,8	0,13	304	0,00	0,46
100	3000	75,0	6,33	645	3,32	0,80	57,0	4,76	615	3,04	0,78	48,0	4,59	645	2,39	0,70	36,0	3,33	591	2,24	0,68
	1500	37,0	4,01	817	2,42	0,80	28,0	2,63	670	2,19	0,77	24,0	2,91	817	1,74	0,70	18,0	1,74	599	1,61	0,66
	1000	25,0	3,13	933	2,09	0,78	18,0	1,92	704	1,88	0,74	16,0	2,17	886	1,52	0,68	12,0	1,23	599	1,40	0,62
	750	18,0	2,65	1025	1,90	0,76	14,0	1,53	728	1,71	0,72	12,0	1,70	886	1,39	0,65	9,0	0,94	599	1,28	0,61
	500	12,0	2,13	1169	1,67	0,72	9,4	1,11	762	1,51	0,69	8,1	1,21	886	1,24	0,61	6,0	0,67	599	1,15	0,57
	150	3,8	1,00	1581	0,00	0,62	2,8	0,45	870	0,00	0,59	2,4	0,44	886	0,00	0,50	1,8	0,24	599	0,00	0,47
125	3000	75,0	9,57	987	5,22	0,81	57,0	7,93	1037	4,93	0,79	48,0	6,86	988	3,75	0,73	36,0	5,72	1043	3,55	0,69
	1500	37,0	6,10	1242	4,00	0,80	28,0	4,44	1132	3,71	0,77	24,0	4,37	1243	2,86	0,72	18,0	3,30	1167	2,66	0,67
	1000	25,0	4,81	1470	3,52	0,80	18,0	3,15	1189	3,23	0,76	16,0	3,38	1421	2,52	0,71	12,0	2,23	1167	2,33	0,66
	750	18,0	4,25	1690	3,20	0,78	14,0	2,48	1230	2,93	0,75	12,0	2,87	1562	2,32	0,69	9,0	1,73	1167	2,13	0,64
	500	12,0	3,35	1922	2,79	0,75	9,4	1,83	1289	2,56	0,71	8,1	2,25	1731	2,05	0,65	6,0	1,23	1167	1,89	0,60
	150	3,8	1,42	2310	0,00	0,64	2,8	0,73	1470	0,00	0,61	2,4	0,84	1731	0,00	0,52	1,8	0,46	1167	0,00	0,48
160	3000	75,0	17,04	1801	8,41	0,83	57,0	13,62	1896	7,93	0,81	48,0	11,97	1800	6,00	0,75	36,0	9,76	1906	5,72	0,73
	1500	37,0	10,73	2267	6,92	0,83	28,0	8,52	2372	6,39	0,81	24,0	7,53	2266	4,87	0,75	18,0	6,10	2347	4,55	0,72
	1000	25,0	8,73	2735	6,25	0,82	18,0	6,05	2494	5,69	0,80	16,0	5,82	2591	4,42	0,74	12,0	4,18	2347	4,07	0,70
	750	18,0	7,73	3190	5,76	0,81	14,0	4,81	2582	5,19	0,78	12,0	4,86	2848	4,09	0,73	9,0	3,18	2347	3,74	0,69
	500	12,0	6,11	3688	5,02	0,79	9,4	3,50	2708	4,52	0,75	8,1	3,83	3225	3,63	0,70	6,0	2,25	2347	3,31	0,65
	150	3,8	2,90	4952	0,00	0,67	2,8	1,40	3091	0,00	0,64	2,4	1,61	3552	0,00	0,55	1,8	0,74	2347	0,00	0,59
200	3000	75,0	23,93	2560	12,58	0,84	57,0	21,71	3003	11,96	0,82	48,0	18,60	2835	8,90	0,76	36,0	15,43	3016	8,61	0,74
	1500	37,0	18,04	3860	11,27	0,84	28,0	13,99	3870	10,48	0,82	24,0	11,56	3569	7,77	0,77	18,0	9,58	3797	7,38	0,75
	1000	25,0	14,66	4761	10,56	0,85	18,0	11,19	4701	9,65	0,83	16,0	8,81	4081	7,28	0,77	12,0	7,31	4343	6,80	0,75
	750	18,0	13,14	5620	9,89	0,84	14,0	9,40	5200	8,93	0,82	12,0	7,36	4488	6,85	0,76	9,0	6,06	4675	6,34	0,73
	500	12,0	10,56	6613	8,75	0,82	9,4	6,79	5428	7,81	0,79	8,1	5,84	5128	6,14	0,73	6,0	4,21	4675	5,62	0,70
	150	3,8	5,58	9942	0,00	0,70	2,8	3,09	6985	0,00	0,67	2,4	2,99	6946	0,00	0,58	1,8	1,61	4675	0,00	0,55
250	1500	37,0	33,90	7510	24,21	0,87	28,0	27,44	7870	18,29	0,85	24,0	21,87	6819	14,58	0,79	18,0	18,60	7765	14,31	0,79
	1000	25,0	25,52	8480	23,20	0,87	18,0	20,64	8881	15,88	0,85	16,0	17,23	8060	13,25	0,79	12,0	14,18	8770	14,18	0,78
	750	18,0	20,87	9250	18,98	0,87	14,0	16,88	9685	16,88	0,85	12,0	14,09	8787	14,09	0,79	9,0	11,25	9155	11,25	0,77
	500	12,0	16,08	10445	17,87	0,85	9,4	13,01	10935	13,01	0,83	8,1	10,88	9918	10,88	0,77	6,0	7,80	9155	9,75	0,74
	150	3,8	7,29	13720	0,00	0,74	2,8	5,81	13720	0,00	0,70	2,4	5,14	12581	0,00	0,62	1,8	2,94	9155	0,00	0,59

Table **9.4.5-1**

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



Characteristics

Characteristic	Standard	Option
Toothing	Hardened and ground worm shaft / bronze worm gear	See chapter 9.2.1
Gear ratio	5:1 to 83:1	
Housing / Flanges	Grey cast iron	
Threaded mounting hole	On gearbox side 1 and on the flanges	See chapter 9.2.3
Shaft	Material 1 C45, shaft ends greased Fit with ISO j6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	Material 1 C45, shafts greased Fit with ISO H7 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.3
Radial shaft seal ring	NBR, form A	See chapter 4.8
Ambient temperature	- 10°C to +90°C. The values of the performance tables are valid for 20°C	See chapter 4.9.3
Circumferential backlash	< 30 arcmin	See chapter 9.2.10
Protection class	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness > 40 µm	See chapter 4.4.1
Bearing life L10h	more than 15,000h	See chapter 4.9.1
Oil change intervals	Not required if the oil temperature is kept below 90°C. The lifetime of the bearings can be increased by the factor 1.5 if the oil is changed after the first 500 service hours and then every 5000 service hours.	See chapter 9.2.8
Lubricants	Synthetic lubricants	See chapter 9.2.8
Flange	Suited for the mounting of IEC motors, models IM B5 and B14	
Coupling	Three-piece claw coupling	

Performance data

i	i ist		n_1 [rpm]					
			3000	1500	1000	750	500	150
5:1	29:6	n_2 [rpm]	600.0	300.0	200.0	150.0	100.0	30.0
		P_{1N} [kW]	2.26	1.43	1.09	0.87	0.64	0.25
		T_{2N} [Nm]	33	41	47	49	53	67
		P_{1NT} [kW]	1.85	1.25	1.10	0.90	0.80	0.00
		Efficiency	0.94	0.94	0.93	0.87	0.90	0.86
7.5:1	29:4	n_2 [rpm]	400.0	200.0	133.0	100.0	66.0	20.0
		P_{1N} [kW]	1.68	1.06	0.81	0.65	0.48	0.19
		T_{2N} [Nm]	36	45	51	54	58	73
		P_{1NT} [kW]	1.45	0.95	0.77	0.70	0.61	0.00
		Efficiency	0.92	0.91	0.90	0.89	0.87	0.82
10:1	39:4	n_2 [rpm]	300.0	150.0	100.0	75.0	50.0	15.0
		P_{1N} [kW]	1.39	0.77	0.55	0.43	0.32	0.13
		T_{2N} [Nm]	39	43	45	47	50	64
		P_{1NT} [kW]	1.28	0.83	0.69	0.63	0.87	0.00
		Efficiency	0.91	0.90	0.88	0.87	0.85	0.81
13:1	52:4	n_2 [rpm]	230.0	115.0	76.0	57.0	38.0	11.0
		P_{1N} [kW]	0.85	0.45	0.32	0.26	0.19	0.08
		T_{2N} [Nm]	31	32	34	36	39	50
		P_{1NT} [kW]	1.13	0.75	0.63	0.57	0.52	0.00
		Efficiency	0.88	0.87	0.85	0.84	0.83	0.80
15:1	29:2	n_2 [rpm]	200.0	100.0	66.0	50.0	33.0	10.0
		P_{1N} [kW]	0.93	0.60	0.48	0.39	0.29	0.12
		T_{2N} [Nm]	37	48	55	58	63	79
		P_{1NT} [kW]	0.85	0.55	0.46	0.41	0.36	0.00
		Efficiency	0.86	0.84	0.82	0.81	0.78	0.72
20:1	39:2	n_2 [rpm]	150.0	75.0	50.0	37.0	25.0	7.5
		P_{1N} [kW]	0.82	0.49	0.36	0.28	0.21	0.09
		T_{2N} [Nm]	43	50	53	55	58	75
		P_{1NT} [kW]	0.77	0.49	0.42	0.38	0.34	0.00
		Efficiency	0.84	0.82	0.80	0.78	0.76	0.71

i	i ist		n_1 [rpm]					
			3000	1500	1000	750	500	150
26:1	52:2	n_2 [rpm]	115.0	57.0	38.0	28.0	19.0	5.8
		P_{1N} [kW]	0.55	0.30	0.21	0.17	0.12	0.05
		T_{2N} [Nm]	36	38	40	42	45	59
		P_{1NT} [kW]	0.68	0.44	0.38	0.34	0.31	0.00
		Efficiency	0.80	0.78	0.76	0.75	0.73	0.69
30:1	29:1	n_2 [rpm]	100.0	50.0	33.0	25.0	16.0	5.0
		P_{1N} [kW]	0.53	0.37	0.29	0.24	0.18	0.08
		T_{2N} [Nm]	36	50	57	60	65	82
		P_{1NT} [kW]	0.51	0.33	0.28	0.26	0.23	0.00
		Efficiency	0.75	0.73	0.70	0.68	0.64	0.57
40:1	39:1	n_2 [rpm]	75.0	37.0	25.0	18.0	12.0	3.8
		P_{1N} [kW]	0.48	0.32	0.25	0.20	0.15	0.07
		T_{2N} [Nm]	44	56	63	66	71	91
		P_{1NT} [kW]	0.46	0.30	0.25	0.23	0.21	0.00
		Efficiency	0.72	0.70	0.67	0.65	0.62	0.56
53:1	52:1	n_2 [rpm]	57.0	28.0	18.0	14.0	9.4	2.8
		P_{1N} [kW]	0.39	0.21	0.15	0.13	0.09	0.04
		T_{2N} [Nm]	44	46	48	51	55	72
		P_{1NT} [kW]	0.42	0.28	0.24	0.22	0.20	0.00
		Efficiency	0.68	0.65	0.63	0.61	0.59	0.55
62:1	63:1	n_2 [rpm]	48.0	24.0	16.0	12.0	8.1	2.4
		P_{1N} [kW]	0.36	0.20	0.15	0.12	0.09	0.03
		T_{2N} [Nm]	45	48	51	53	56	57
		P_{1NT} [kW]	0.35	0.23	0.20	0.18	0.16	0.00
		Efficiency	0.63	0.59	0.56	0.54	0.51	0.45
83:1	82:1	n_2 [rpm]	36.0	18.0	12.0	9.0	6.0	1.8
		P_{1N} [kW]	0.25	0.14	0.10	0.08	0.05	0.02
		T_{2N} [Nm]	36	37	38	38	38	38
		P_{1NT} [kW]	0.32	0.21	0.18	0.17	0.15	0.00
		Efficiency	0.56	0.52	0.50	0.48	0.46	0.42

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

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

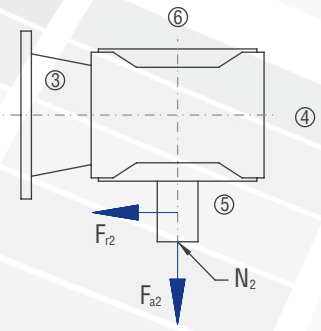
n_2 [rpm]	200		125		75		50		30		10	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 80	970	485	1250	625	1380	690	1600	800	1800	900	2500	1250

Inertia moments/mass

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

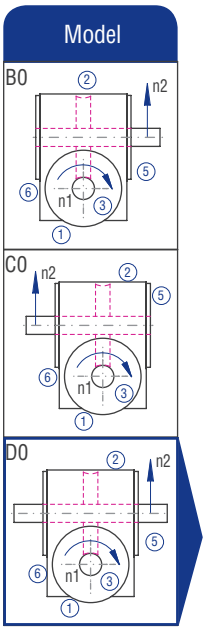
	Inertia moment [kgcm^2]											
	5:1	7.5:1	10:1	13:1	15:1	20:1	26:1	30:1	40:1	53:1	62:1	83:1
J1	0.68	0.60	0.53	0.50	0.54	0.50	0.48	0.53	0.49	0.47	0.48	0.47

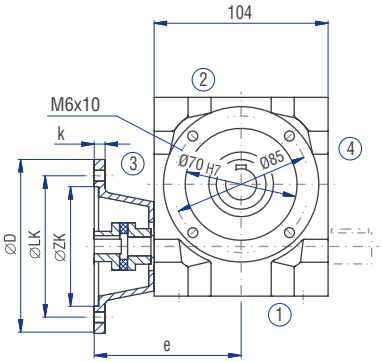
Mass ca. [kg]
7

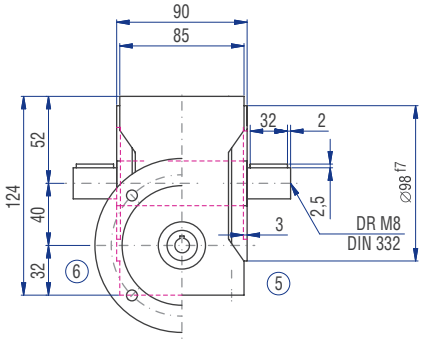


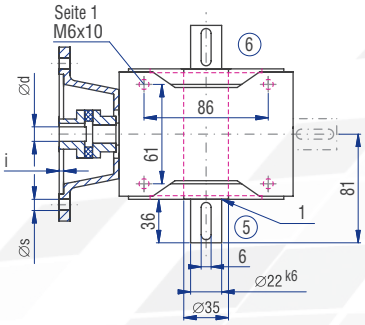
The mass of the gearbox may deviate depending on the flange size, the type and the gear ratio.

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

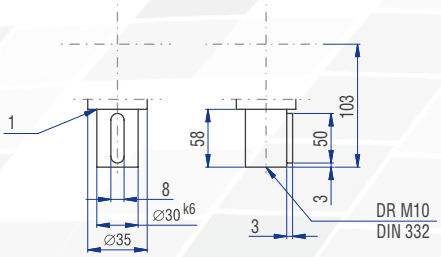


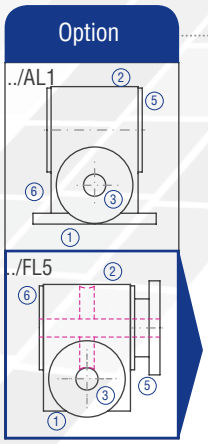


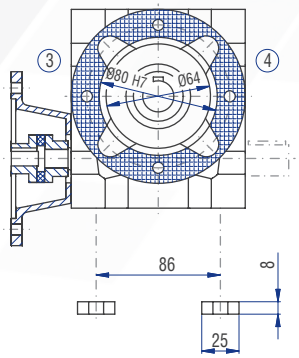


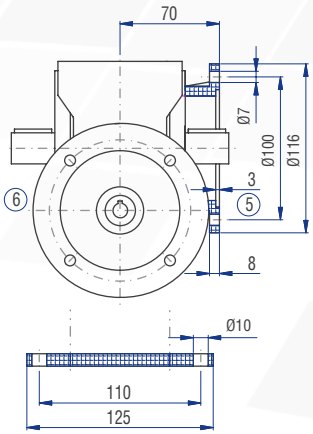


Implementation VV



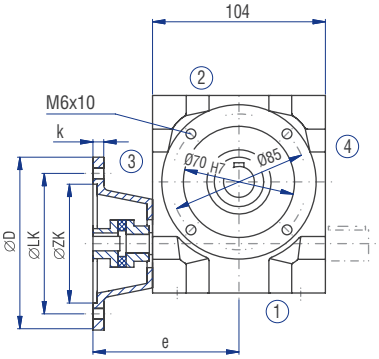


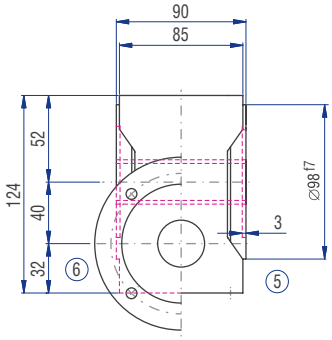




IEC motor	Model	Motor shaft (dxl)	Flange diameter D [mm]	LK [mm]	ZK [mm]	s [mm]	i [mm]	k [mm]	e [mm]
63	B14	11x23	120	100	80	7	3	10	121
	B5	11x23	140	115	95	9	3	10	121
71	B14	14x30	140	115	95	9	3	10	121
	B14	14x30	105	85	70	7	3	10	121

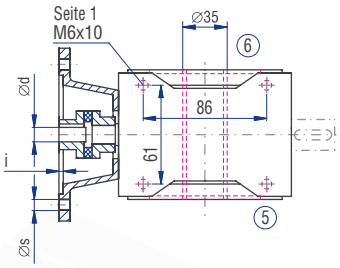
The dimensions of the Models not shown can be figured by mirroring available dimensions.

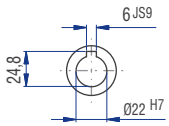


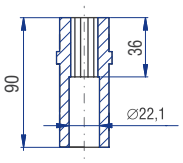


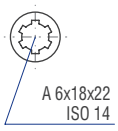
E0N0

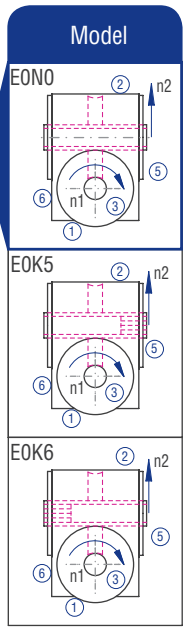
E0K5 / E0K6

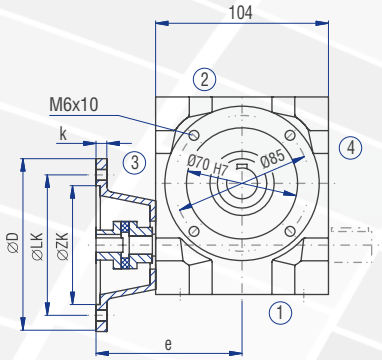


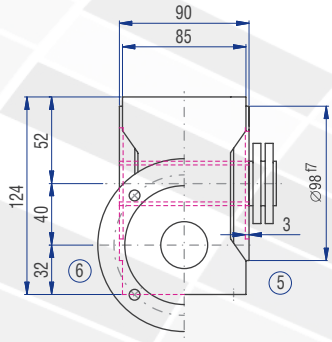


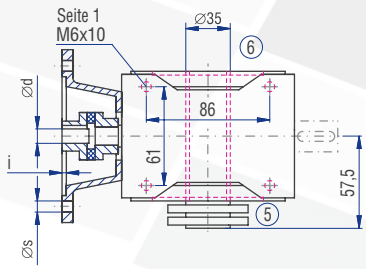


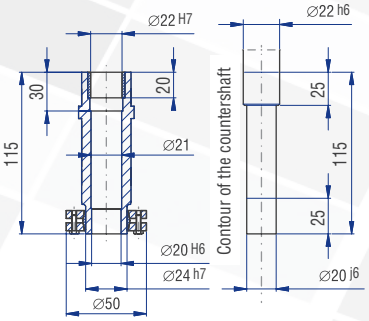


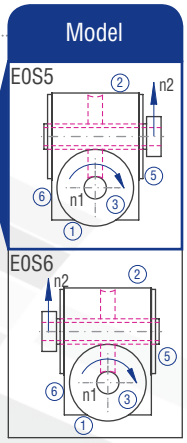




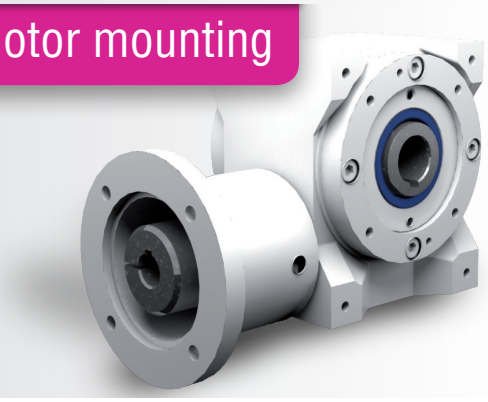








9.4.7 Type SL 050 – Type S with flange for motor mounting



Characteristics

Characteristic	Standard	Option
Toothing	Hardened and ground worm shaft / bronze worm gear	See chapter 9.2.1
Gear ratio	5:1 to 83:1	
Housing / Flanges	Grey cast iron	
Threaded mounting hole	On gearbox side 1 and on the flanges	See chapter 9.2.3
Shaft	Material 1 C45, shaft ends greased Fit with ISO j6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	Material 1 C45, shafts greased Fit with ISO H7 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.3
Radial shaft seal ring	NBR, form A	See chapter 4.8
Ambient temperature	- 10°C to +90°C. The values of the performance tables are valid for 20°C	See chapter 4.9.3
Circumferential backlash	< 30 arcmin	See chapter 9.2.10
Protection class	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness > 40 µm	See chapter 4.4.1
Bearing life L10h	more than 15,000h	See chapter 4.9.1
Oil change intervals	Not required if the oil temperature is kept below 90°C. The lifetime of the bearings can be increased by the factor 1.5 if the oil is changed after the first 500 service hours and then every 5000 service hours.	See chapter 9.2.8
Lubricants	Synthetic lubricants	See chapter 9.2.8
Flange	Suited for the mounting of IEC motors, models IM B5 and B14	
Coupling	Three-piece claw coupling	

Performance data

i	i ist		n_1 [rpm]					
			3000	1500	1000	750	500	150
5:1	29:6	n_2 [rpm]	600.0	300.0	200.0	150.0	100.0	30.0
		P_{1N} [kW]	4.74	3.29	2.54	2.08	1.47	0.54
		T_{2N} [Nm]	70	96	110	119	125	145
		P_{1NT} [kW]	3.90	2.76	2.10	2.04	1.76	0.00
		Efficiency	0.96	0.95	0.94	0.93	0.92	0.88
7.5:1	29:4	n_2 [rpm]	400.0	200.0	133.0	100.0	66.0	20.0
		P_{1N} [kW]	3.41	2.42	1.84	1.43	1.01	0.40
		T_{2N} [Nm]	74	104	117	120	125	153
		P_{1NT} [kW]	3.16	2.12	1.76	1.57	1.36	0.00
		Efficiency	0.94	0.93	0.92	0.91	0.89	0.83
10:1	38:4	n_2 [rpm]	300.0	150.0	100.0	75.0	50.0	15.0
		P_{1N} [kW]	3.02	1.64	1.15	0.96	0.71	0.26
		T_{2N} [Nm]	85	91	94	103	112	130
		P_{1NT} [kW]	2.82	1.88	1.56	1.40	1.23	0.00
		Efficiency	0.93	0.92	0.90	0.89	0.87	0.82
13:1	51:4	n_2 [rpm]	230.0	115.0	76.0	57.0	38.0	11.0
		P_{1N} [kW]	1.51	0.82	0.58	0.45	0.32	0.12
		T_{2N} [Nm]	55	59	62	64	66	75
		P_{1NT} [kW]	2.51	1.67	0.14	1.27	1.13	0.00
		Efficiency	0.90	0.89	0.88	0.87	0.85	0.80
15:1	29:2	n_2 [rpm]	200.0	100.0	66.0	50.0	33.0	10.0
		P_{1N} [kW]	1.82	1.32	1.02	0.84	0.65	0.26
		T_{2N} [Nm]	74	106	120	131	145	179
		P_{1NT} [kW]	1.91	1.27	1.05	0.94	0.82	0.00
		Efficiency	0.88	0.87	0.85	0.84	0.81	0.74
20:1	38:2	n_2 [rpm]	150.0	75.0	50.0	37.0	25.0	7.5
		P_{1N} [kW]	1.54	1.03	0.73	0.63	0.47	0.18
		T_{2N} [Nm]	81	106	110	123	133	158
		P_{1NT} [kW]	1.70	1.12	0.93	0.84	0.74	0.00
		Efficiency	0.87	0.85	0.83	0.81	0.78	0.72

i	i ist		n_1 [rpm]					
			3000	1500	1000	750	500	150
26:1	51:2	n_2 [rpm]	115.0	57.0	38.0	28.0	19.0	5.8
		P_{1N} [kW]	1.04	0.58	0.42	0.32	0.24	0.09
		T_{2N} [Nm]	71	76	80	82	86	98
		P_{1NT} [kW]	1.51	1.00	0.84	0.76	0.68	0.00
		Efficiency	0.84	0.81	0.79	0.78	0.75	0.70
30:1	29:1	n_2 [rpm]	100.0	50.0	33.0	25.0	16.0	5.0
		P_{1N} [kW]	1.12	0.79	0.59	0.54	0.42	0.18
		T_{2N} [Nm]	82	113	121	144	157	201
		P_{1NT} [kW]	1.14	0.76	0.63	0.06	0.50	0.00
		Efficiency	0.79	0.77	0.74	0.72	0.68	0.59
40:1	38:1	n_2 [rpm]	75.0	37.0	25.0	18.0	12.0	3.8
		P_{1N} [kW]	0.87	0.65	0.52	0.41	0.31	0.13
		T_{2N} [Nm]	80	118	134	137	147	183
		P_{1NT} [kW]	1.02	0.68	0.57	0.52	0.46	0.00
		Efficiency	0.76	0.75	0.71	0.69	0.65	0.57
53:1	51:1	n_2 [rpm]	57.0	28.0	18.0	14.0	9.4	2.8
		P_{1N} [kW]	0.65	0.38	0.27	0.22	0.16	0.06
		T_{2N} [Nm]	77	85	88	91	95	110
		P_{1NT} [kW]	0.92	0.62	0.52	0.48	0.43	0.00
		Efficiency	0.73	0.69	0.67	0.64	0.61	0.55
62:1	62:1	n_2 [rpm]	48.0	24.0	16.0	12.0	8.1	2.4
		P_{1N} [kW]	0.61	0.42	0.31	0.25	0.18	0.06
		T_{2N} [Nm]	81	105	109	112	113	113
		P_{1NT} [kW]	0.75	0.50	0.43	0.39	0.36	0.00
		Efficiency	0.67	0.64	0.60	0.57	0.53	0.45
83:1	83:1	n_2 [rpm]	36.0	18.0	12.0	9.0	6.0	1.8
		P_{1N} [kW]	0.39	0.21	0.15	0.12	0.09	0.03
		T_{2N} [Nm]	59	63	64	66	69	75
		P_{1NT} [kW]	0.70	0.47	0.41	0.37	0.34	0.00
		Efficiency	0.58	0.56	0.54	0.52	0.49	0.44

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

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

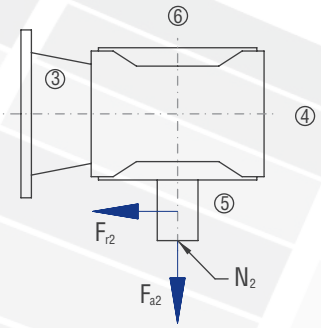
n_2 [rpm]	200		125		75		50		30		10	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 120	2000	1000	2400	1200	2850	1425	3350	1675	4000	2000	4800	2400
> 120	1540	770	1850	925	2190	1095	2580	1290	3080	1540	3700	1850

Inertia moments/mass

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

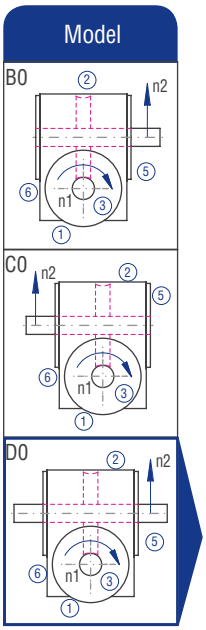
	Inertia moment [kgcm^2]											
	5:1	7.5:1	10:1	13:1	15:1	20:1	26:1	30:1	40:1	53:1	62:1	83:1
J1	2.03	1.81	1.66	1.57	1.68	1.58	1.52	1.65	1.56	1.50	1.55	1.50

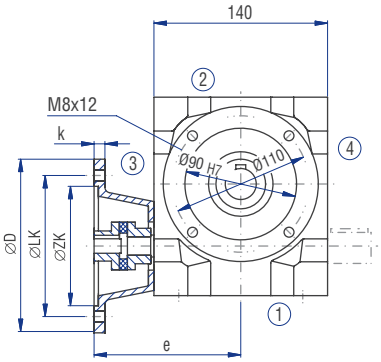
Mass ca. [kg]
14

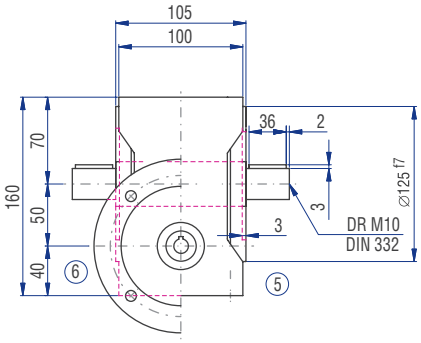


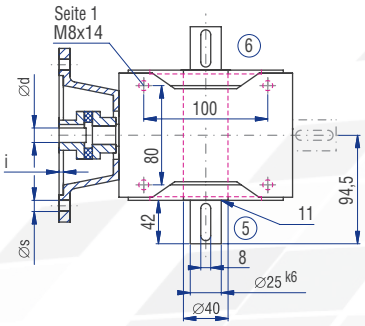
The mass of the gearbox may deviate depending on the flange size, the type and the gear ratio.

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

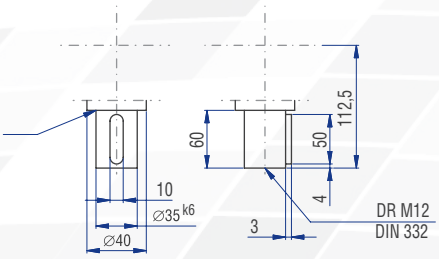


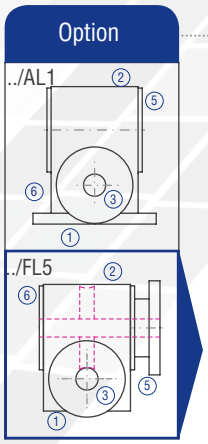


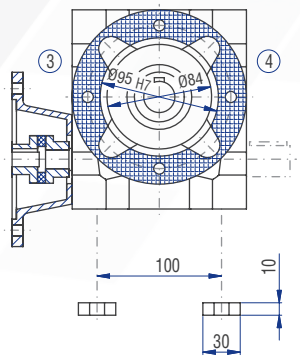


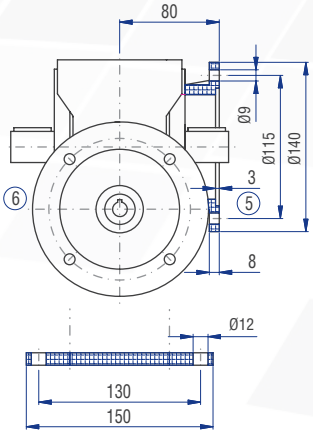


Implementation VV



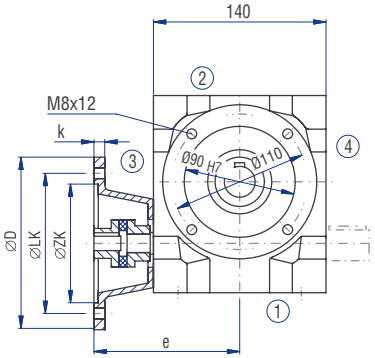


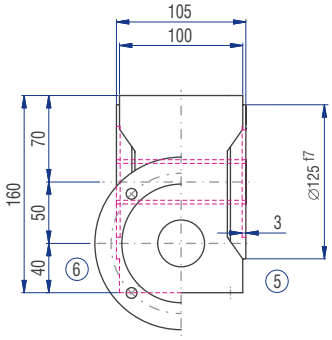




IEC motor	Model	Motor shaft (dxl)	Flange diameter D [mm]	LK [mm]	ZK [mm]	s [mm]	i [mm]	k [mm]	e [mm]
63	B14	11x23	120	100	80	7	3	9	150
80	B14	19x40	120	100	80	7	3	9	150
	B14	19x40	160	130	110	9	4	10	150
90	B14	24x50	160a	130	110	9	4	20	160

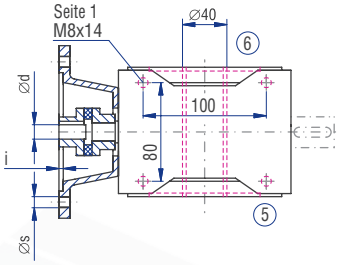
The dimensions of the Models not shown can be figured by mirroring available dimensions.

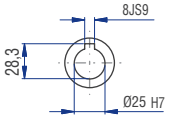


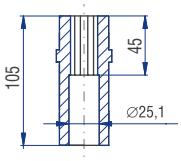


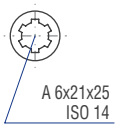
E0N0

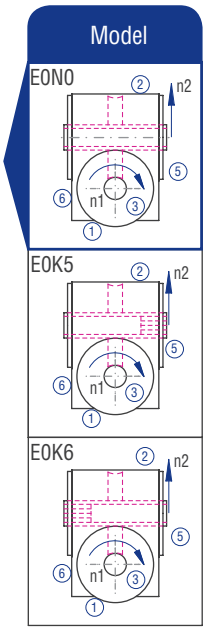
E0K5 / E0K6

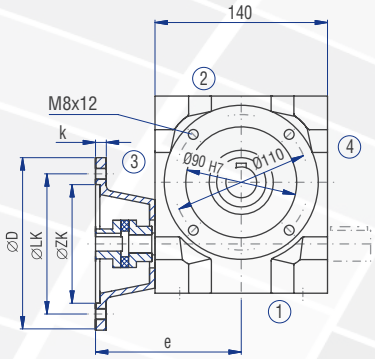


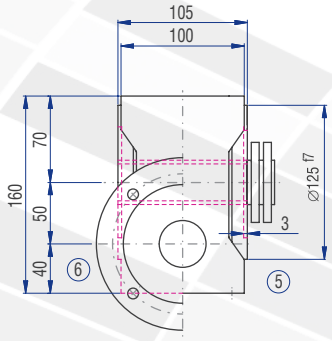


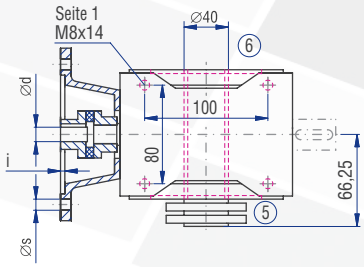


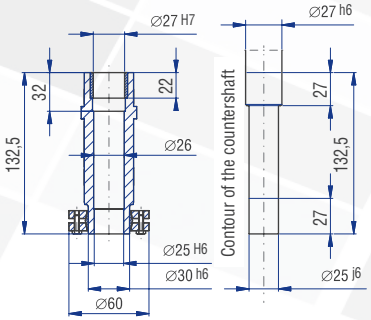


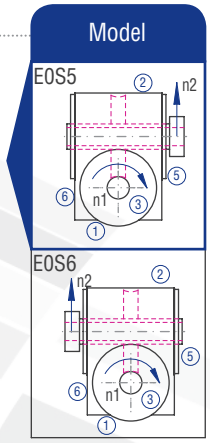




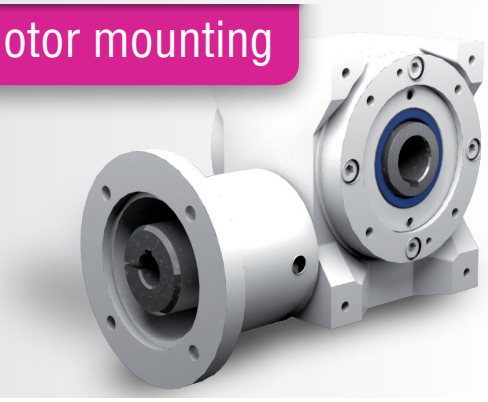








9.4.8 Type SL 063 – Type S with flange for motor mounting



Characteristics

Characteristic	Standard	Option
Toothing	Hardened and ground worm shaft / bronze worm gear	See chapter 9.2.1
Gear ratio	5:1 to 83:1	
Housing / Flanges	Grey cast iron	
Threaded mounting hole	On gearbox side 1 and on the flanges	See chapter 9.2.3
Shaft	Material 1 C45, shaft ends greased Fit with ISO j6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	Material 1 C45, shafts greased Fit with ISO H7 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.3
Radial shaft seal ring	NBR, form A	See chapter 4.8
Ambient temperature	- 10°C to +90°C. The values of the performance tables are valid for 20°C	See chapter 4.9.3
Circumferential backlash	< 30 arcmin	See chapter 9.2.10
Protection class	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness > 40 µm	See chapter 4.4.1
Bearing life L10h	more than 15,000h	See chapter 4.9.1
Oil change intervals	Not required if the oil temperature is kept below 90°C. The lifetime of the bearings can be increased by the factor 1.5 if the oil is changed after the first 500 service hours and then every 5000 service hours.	See chapter 9.2.8
Lubricants	Synthetic lubricants	See chapter 9.2.8
Flange	Suited for the mounting of IEC motors, models IM B5 and B14	
Coupling	Three-piece claw coupling	

Performance data

i	i ist		n_1 [rpm]					
			3000	1500	1000	750	500	150
5:1	29:6	n_2 [rpm]	600.0	300.0	200.0	150.0	100.0	30.0
		P_{1N} [kW]	6.37	4.96	3.77	3.11	2.31	0.91
		T_{2N} [Nm]	94	145	165	180	198	247
		P_{1NT} [kW]	5.80	4.25	3.56	3.15	2.67	0.00
		Efficiency	0.96	0.95	0.95	0.94	0.93	0.88
7.5:1	29:4	n_2 [rpm]	400.0	200.0	133.0	100.0	66.0	20.0
		P_{1N} [kW]	4.89	3.62	2.78	2.37	1.79	0.72
		T_{2N} [Nm]	106	157	179	201	223	280
		P_{1NT} [kW]	4.63	3.26	2.72	2.41	2.06	0.00
		Efficiency	0.94	0.94	0.93	0.92	0.90	0.84
10:1	39:4	n_2 [rpm]	300.0	150.0	100.0	75.0	50.0	15.0
		P_{1N} [kW]	4.15	2.94	2.26	1.83	1.30	0.51
		T_{2N} [Nm]	121	170	194	207	216	265
		P_{1NT} [kW]	4.16	2.89	2.41	2.15	1.86	0.00
		Efficiency	0.94	0.93	0.92	0.91	0.89	0.83
13:1	51:4	n_2 [rpm]	230.0	115.0	76.0	57.0	38.0	11.0
		P_{1N} [kW]	3.31	1.81	1.29	1.00	0.71	0.26
		T_{2N} [Nm]	125	135	141	145	151	170
		P_{1NT} [kW]	3.68	2.53	2.12	1.90	1.66	0.00
		Efficiency	0.93	0.92	0.90	0.89	0.87	0.82
15:1	29:2	n_2 [rpm]	200.0	100.0	66.0	50.0	33.0	10.0
		P_{1N} [kW]	3.12	2.23	1.77	1.51	1.16	0.48
		T_{2N} [Nm]	128	183	213	240	266	333
		P_{1NT} [kW]	2.80	1.95	1.62	1.44	1.23	0.00
		Efficiency	0.89	0.00	0.00	0.86	0.83	0.75
20:1	39:2	n_2 [rpm]	150.0	75.0	50.0	37.0	25.0	7.5
		P_{1N} [kW]	2.95	1.70	1.32	1.14	0.86	0.34
		T_{2N} [Nm]	161	186	212	237	259	310
		P_{1NT} [kW]	2.52	1.73	1.44	1.29	1.12	0.00
		Efficiency	0.88	0.88	0.86	0.84	0.81	0.74

i	i ist		n_1 [rpm]					
			3000	1500	1000	750	500	150
26:1	51:2	n_2 [rpm]	115.0	57.0	38.0	28.0	19.0	5.8
		P_{1N} [kW]	1.89	1.25	0.90	0.71	0.51	0.19
		T_{2N} [Nm]	132	173	181	187	195	222
		P_{1NT} [kW]	2.21	1.52	1.27	1.14	1.01	0.00
		Efficiency	0.86	0.85	0.83	0.81	0.78	0.71
30:1	29:1	n_2 [rpm]	100.0	50.0	33.0	25.0	16.0	5.0
		P_{1N} [kW]	1.94	1.38	1.11	0.97	0.75	0.36
		T_{2N} [Nm]	143	204	237	268	296	403
		P_{1NT} [kW]	1.66	1.15	0.97	0.86	0.75	0.00
		Efficiency	0.80	0.80	0.77	0.75	0.71	0.61
40:1	39:1	n_2 [rpm]	75.0	37.0	25.0	18.0	12.0	3.8
		P_{1N} [kW]	1.54	1.08	0.85	0.74	0.57	0.24
		T_{2N} [Nm]	149	207	237	264	288	348
		P_{1NT} [kW]	1.50	1.04	0.87	0.78	0.69	0.00
		Efficiency	0.78	0.77	0.75	0.72	0.68	0.59
53:1	51:1	n_2 [rpm]	57.0	28.0	18.0	14.0	9.4	2.8
		P_{1N} [kW]	1.16	0.80	0.58	0.47	0.34	0.14
		T_{2N} [Nm]	143	191	200	207	217	248
		P_{1NT} [kW]	1.34	0.96	0.78	0.71	0.63	0.00
		Efficiency	0.76	0.74	0.71	0.68	0.65	0.56
62:1	61:1	n_2 [rpm]	48.0	24.0	16.0	12.0	8.1	2.4
		P_{1N} [kW]	0.82	0.66	0.53	0.46	0.34	0.12
		T_{2N} [Nm]	110	175	202	221	226	226
		P_{1NT} [kW]	1.10	0.76	0.65	0.59	0.52	0.00
		Efficiency	0.69	0.68	0.65	0.62	0.57	0.47
83:1	82:1	n_2 [rpm]	36.0	18.0	12.0	9.0	6.0	1.8
		P_{1N} [kW]	0.75	0.46	0.33	0.26	0.19	0.07
		T_{2N} [Nm]	129	152	152	152	152	152
		P_{1NT} [kW]	0.99	0.69	0.59	0.54	0.49	0.00
		Efficiency	0.66	0.63	0.59	0.56	0.52	0.44

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

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

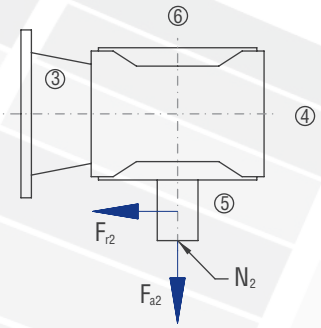
n_2 [rpm]	200		125		75		50		30		10	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 220	2700	1350	3150	1575	3800	1900	4500	2250	5200	2600	5200	2600
> 220	2080	1040	2420	1210	2920	1460	3460	1730	4000	2000	4000	2000

Inertia moments/mass

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

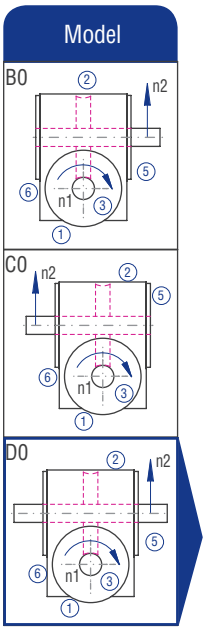
	Inertia moment [kgcm²]											
	5:1	7.5:1	10:1	13:1	15:1	20:1	26:1	30:1	40:1	53:1	62:1	83:1
J1	3.25	2.72	2.22	2.02	2.41	2.02	1.90	2.33	1.98	1.87	2.05	1.88

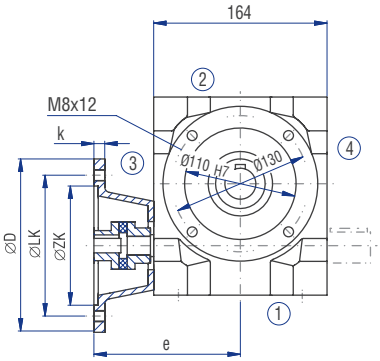
Mass ca. [kg]
21

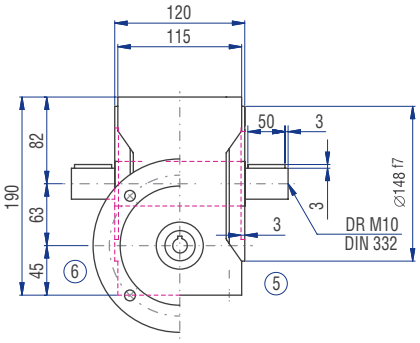


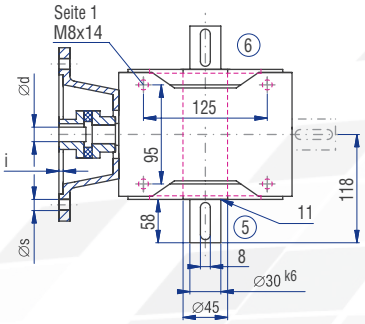
The mass of the gearbox may deviate depending on the flange size, the type and the gear ratio.

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

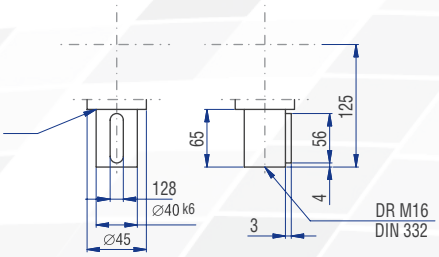


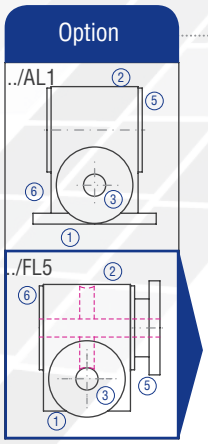


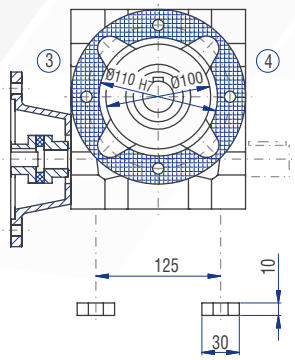


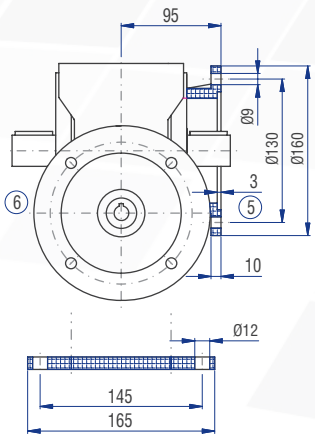


Implementation VV



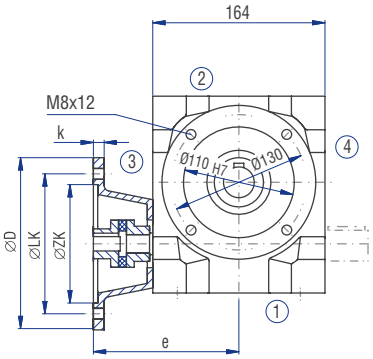


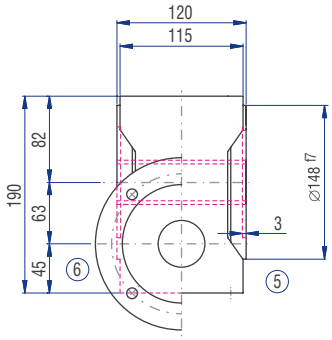


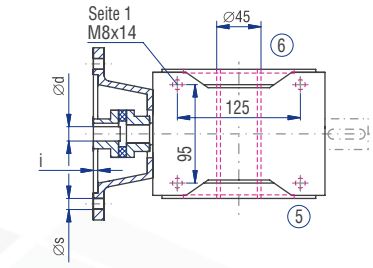


IEC motor	Model	Motor shaft (dxl)	Flange diameter D [mm]	LK [mm]	ZK [mm]	s [mm]	i [mm]	k [mm]	e [mm]
71	B5	14x30	160	130	110	9	4	10	163
80	B14	19x40	160	130	110	9	4	10	163
	B5	19x40	200	165	130	11	4	10	175
90	B14	24x50	160a	130	110	9	4	10	175
	B5	24x50	200	165	130	11	4	10	175
100	B14	28x60	200a	165	130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

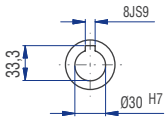
The dimensions of the Models not shown can be figured by mirroring available dimensions.



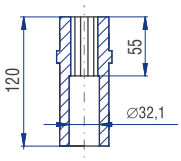


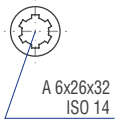


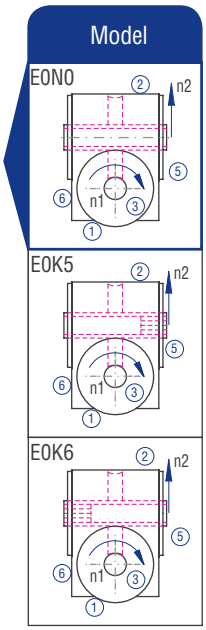
E0N0

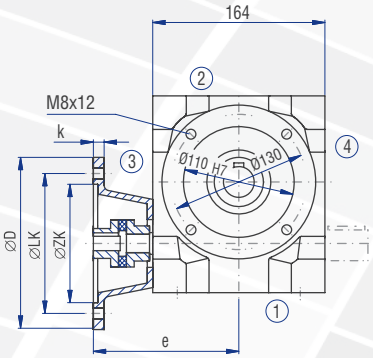


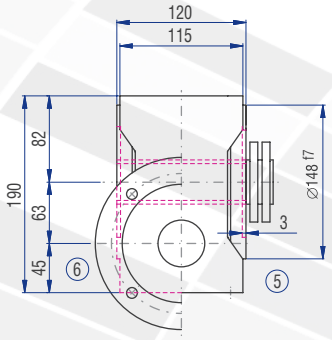
E0K5 / E0K6

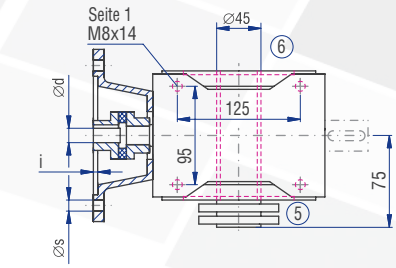


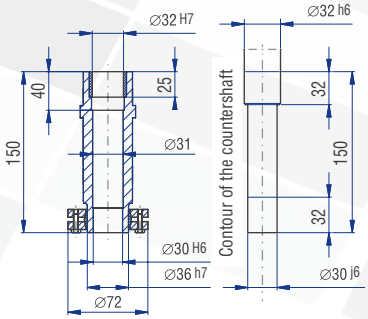


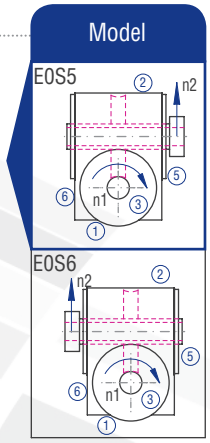




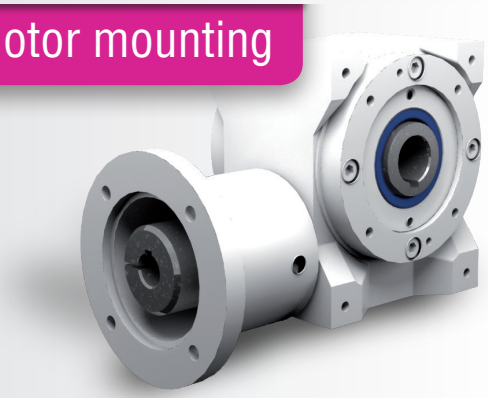








9.4.9 Type SL 080 – Type S with flange for motor mounting



Characteristics

Characteristic	Standard	Option
Toothing	Hardened and ground worm shaft / bronze worm gear	See chapter 9.2.1
Gear ratio	5:1 to 83:1	
Housing / Flanges	Grey cast iron	
Threaded mounting hole	On gearbox side 1 and on the flanges	See chapter 9.2.3
Shaft	Material 1 C45, shaft ends greased Fit with ISO j6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	Material 1 C45, shafts greased Fit with ISO H7 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.3
Radial shaft seal ring	NBR, form A	See chapter 4.8
Ambient temperature	- 10°C to +90°C. The values of the performance tables are valid for 20°C	See chapter 4.9.3
Circumferential backlash	< 30 arcmin	See chapter 9.2.10
Protection class	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness > 40 µm	See chapter 4.4.1
Bearing life L10h	more than 15,000h	See chapter 4.9.1
Oil change intervals	Not required if the oil temperature is kept below 90°C. The lifetime of the bearings can be increased by the factor 1.5 if the oil is changed after the first 500 service hours and then every 5000 service hours.	See chapter 9.2.8
Lubricants	Synthetic lubricants	See chapter 9.2.8
Flange	Suited for the mounting of IEC motors, models IM B5 and B14	
Coupling	Three-piece claw coupling	

Performance data

i	i ist		n_1 [rpm]					
			3000	1500	1000	750	500	150
5:1	30:6	n_2 [rpm]	600.0	300.0	200.0	150.0	100.0	30.0
		P_{1N} [kW]	11.13	8.18	4.36	5.55	4.01	1.58
		T_{2N} [Nm]	170	250	298	332	360	448
		P_{1NT} [kW]	8.62	6.68	5.70	5.05	4.24	0.00
		Efficiency	0.96	0.96	0.95	0.94	0.94	0.89
7.5:1	30:4	n_2 [rpm]	400.0	200.0	133.0	100.0	66.0	20.0
		P_{1N} [kW]	8.64	6.37	5.01	4.36	3.33	1.39
		T_{2N} [Nm]	196	289	341	391	439	569
		P_{1NT} [kW]	6.69	5.14	4.37	3.88	3.27	0.00
		Efficiency	0.95	0.95	0.95	0.94	0.92	0.86
10:1	40:4	n_2 [rpm]	300.0	150.0	100.0	75.0	50.0	15.0
		P_{1N} [kW]	6.58	4.96	3.79	3.15	2.35	0.96
		T_{2N} [Nm]	197	297	340	373	408	513
		P_{1NT} [kW]	5.92	4.47	3.79	3.36	2.86	0.00
		Efficiency	0.94	0.94	0.94	0.93	0.91	0.84
13:1	53:4	n_2 [rpm]	230.0	115.0	76.0	57.0	38.0	11.0
		P_{1N} [kW]	4.41	2.41	1.70	1.33	0.94	0.34
		T_{2N} [Nm]	173	187	196	202	210	236
		P_{1NT} [kW]	5.27	3.91	3.32	2.96	2.56	0.00
		Efficiency	0.93	0.92	0.91	0.90	0.88	0.83
15:1	30:2	n_2 [rpm]	200.0	100.0	66.0	50.0	33.0	10.0
		P_{1N} [kW]	5.61	4.10	3.26	2.81	2.18	0.93
		T_{2N} [Nm]	241	352	415	473	530	681
		P_{1NT} [kW]	4.08	3.09	2.62	2.32	1.97	0.00
		Efficiency	0.90	0.90	0.89	0.88	0.85	0.77
20:1	40:2	n_2 [rpm]	150.0	75.0	50.0	37.0	25.0	7.5
		P_{1N} [kW]	4.24	3.04	2.37	2.05	1.57	0.64
		T_{2N} [Nm]	240	344	399	450	498	615
		P_{1NT} [kW]	3.59	2.67	2.26	2.01	1.72	0.00
		Efficiency	0.89	0.89	0.88	0.86	0.83	0.75

i	i ist		n_1 [rpm]					
			3000	1500	1000	750	500	150
26:1	53:2	n_2 [rpm]	115.0	57.0	38.0	28.0	19.0	5.8
		P_{1N} [kW]	2.83	1.67	1.19	0.94	0.68	0.25
		T_{2N} [Nm]	210	245	256	264	275	312
		P_{1NT} [kW]	3.19	2.34	1.99	1.78	1.55	0.00
		Efficiency	0.88	0.87	0.85	0.83	0.80	0.73
30:1	30:1	n_2 [rpm]	100.0	50.0	33.0	25.0	16.0	5.0
		P_{1N} [kW]	3.47	2.52	2.03	1.78	1.38	0.63
		T_{2N} [Nm]	272	395	456	530	593	760
		P_{1NT} [kW]	2.41	1.81	1.54	1.38	1.18	0.00
		Efficiency	0.82	0.82	0.80	0.78	0.75	0.63
40:1	40:1	n_2 [rpm]	75.0	37.0	25.0	18.0	12.0	3.8
		P_{1N} [kW]	2.62	1.87	1.49	1.31	1.02	0.40
		T_{2N} [Nm]	267	381	443	501	553	625
		P_{1NT} [kW]	2.14	1.58	1.35	1.21	1.05	0.00
		Efficiency	0.80	0.80	0.78	0.75	0.71	0.61
53:1	53:1	n_2 [rpm]	57.0	28.0	18.0	14.0	9.4	2.8
		P_{1N} [kW]	1.78	1.04	0.76	0.61	0.45	0.18
		T_{2N} [Nm]	234	271	284	294	308	352
		P_{1NT} [kW]	1.93	1.41	1.20	1.09	0.96	0.00
		Efficiency	0.78	0.77	0.74	0.71	0.68	0.58
62:1	62:1	n_2 [rpm]	48.0	24.0	16.0	12.0	8.1	2.4
		P_{1N} [kW]	1.40	1.01	0.81	0.69	0.54	0.23
		T_{2N} [Nm]	194	279	325	352	393	448
		P_{1NT} [kW]	1.55	1.15	0.98	0.89	0.78	0.00
		Efficiency	0.70	0.70	0.68	0.65	0.61	0.49
83:1	82:1	n_2 [rpm]	36.0	18.0	12.0	9.0	6.0	1.8
		P_{1N} [kW]	1.10	0.90	0.64	0.49	0.35	0.13
		T_{2N} [Nm]	196	304	304	304	304	304
		P_{1NT} [kW]	1.43	1.04	0.90	0.82	0.73	0.00
		Efficiency	0.68	0.65	0.61	0.59	0.55	0.46

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

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

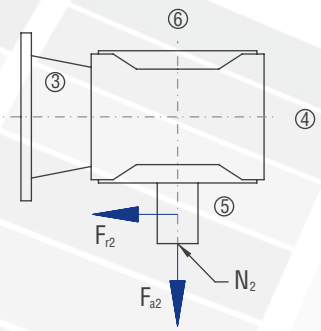
n_2 [rpm]	200		125		75		50		30		10	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 430	3300	1650	3750	1875	4500	2250	5300	2650	6300	3150	7600	3800
> 430	2640	1320	3000	1500	3600	1800	4240	2120	5040	2520	6080	3040

Inertia moments/mass

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

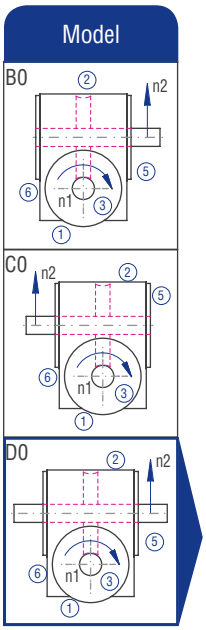
	Inertia moment [kgcm²]											
	5:1	7.5:1	10:1	13:1	15:1	20:1	26:1	30:1	40:1	53:1	62:1	83:1
J1	6.90	5.30	4.04	3.34	4.34	3.48	2.99	4.09	3.34	2.90	3.59	2.99

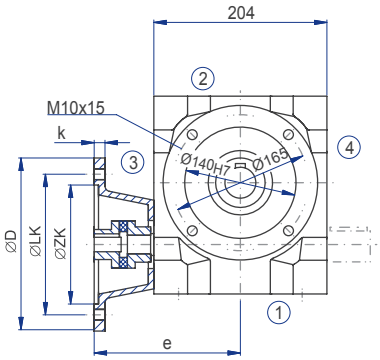
Mass ca. [kg]
33

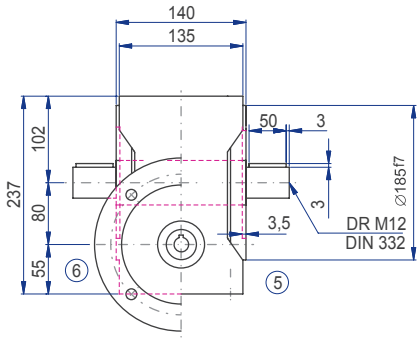


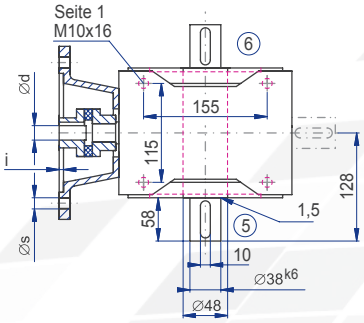
The mass of the gearbox may deviate depending on the flange size, the type and the gear ratio.

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

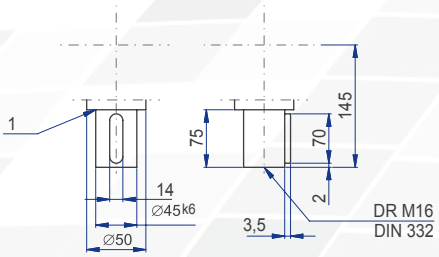


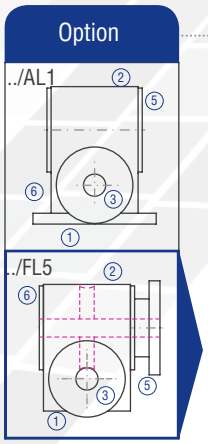


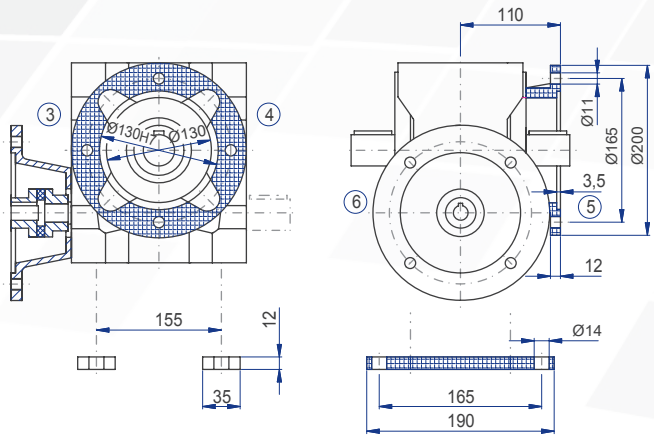




Implementation VV

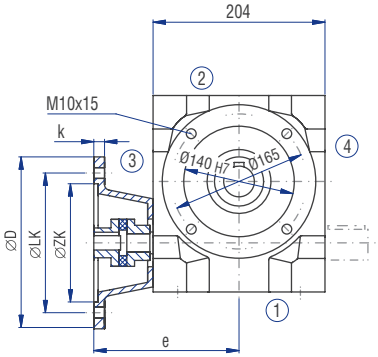


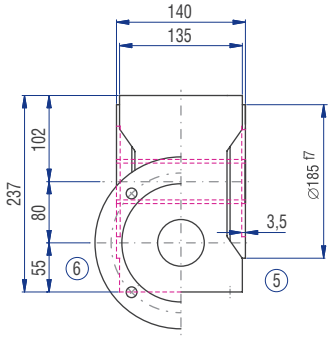


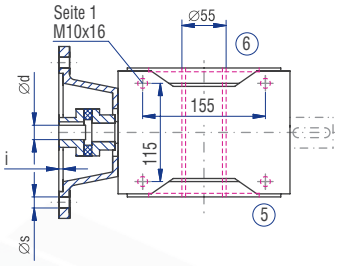


IEC motor	Model	Motor shaft (dxl)	Flange diameter D [mm]	LK [mm]	ZK [mm]	s [mm]	i [mm]	k [mm]	e [mm]
71	B5	14x30	160	130	110	9	4	10	183
80	B14	19x40	160	130	110	9	4	10	183
	B5	19x40	200	165	130	11	4	10	195
90	B14	24x50	160a	130	110	9	4	10	195
	B5	24x50	200	165	130	11	4	10	195
100	B14	28x60	200a	165	130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

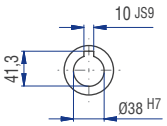
The dimensions of the Models not shown can be figured by mirroring available dimensions.



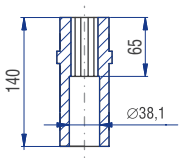


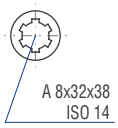


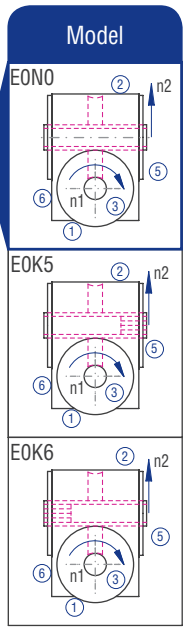
E0N0

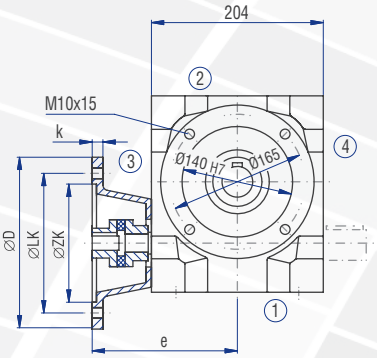


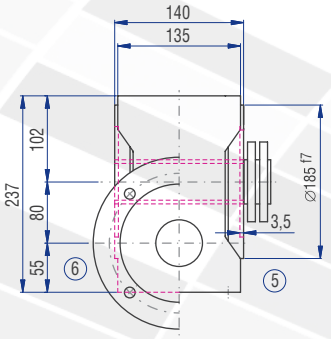
E0K5 / E0K6

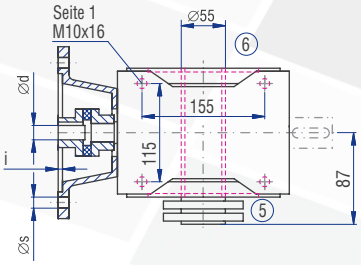


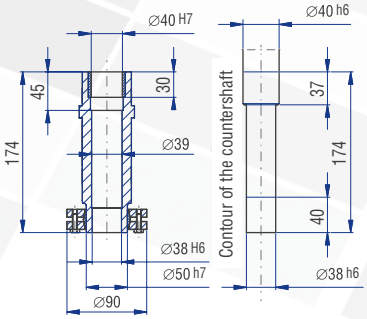


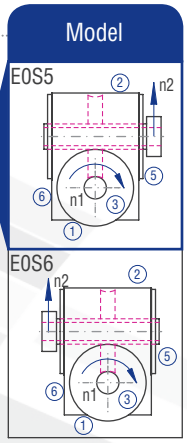




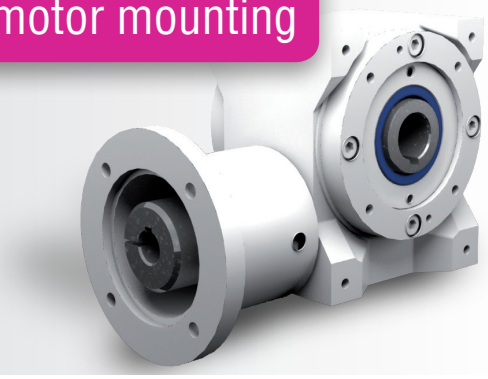








9.4.10 Type SL 100 – Type S with flange for motor mounting



Characteristics

Characteristic	Standard	Option
Toothing	Hardened and ground worm shaft / bronze worm gear	See chapter 9.2.1
Gear ratio	5:1 to 83:1	
Housing / Flanges	Grey cast iron	
Threaded mounting hole	On gearbox side 1 and on the flanges	See chapter 9.2.3
Shaft	Material 1 C45, shaft ends greased Fit with ISO j6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	Material 1 C45, shafts greased Fit with ISO H7 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.3
Radial shaft seal ring	NBR, form A	See chapter 4.8
Ambient temperature	- 10°C to +90°C. The values of the performance tables are valid for 20°C	See chapter 4.9.3
Circumferential backlash	< 30 arcmin	See chapter 9.2.10
Protection class	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness > 40 µm	See chapter 4.4.1
Bearing life L10h	more than 15,000h	See chapter 4.9.1
Oil change intervals	Not required if the oil temperature is kept below 90°C. The lifetime of the bearings can be increased by the factor 1.5 if the oil is changed after the first 500 service hours and then every 5000 service hours.	See chapter 9.2.8
Lubricants	Synthetic lubricants	See chapter 9.2.8
Flange	Suited for the mounting of IEC motors, models IM B5 and B14	
Coupling	Three-piece claw coupling	

Performance data

i	i ist		n_1 [1/min]					
			3000	1500	1000	750	500	150
5:1	30:6	n_2 [1/min]	600,0	300,0	200,0	150,0	100,0	30,0
		P_{1N} [kW]	29,45	19,31	14,99	12,45	9,47	4,01
		T_{2N} [Nm]	450	590	680	745	850	1.150
		P_{1NT} [kW]	11,30	8,60	7,55	6,87	5,96	0,00
		Wirkungsgrad	0,96	0,96	0,95	0,94	0,94	0,90
7,5:1	30:4	n_2 [1/min]	400,0	200,0	133,0	100,0	66,0	20,0
		P_{1N} [kW]	22,62	14,33	10,92	9,10	7,00	3,03
		T_{2N} [Nm]	513	650	743	817	932	1.258
		P_{1NT} [kW]	9,06	6,85	5,99	5,43	4,71	0,00
		Wirkungsgrad	0,95	0,95	0,95	0,94	0,93	0,87
10:1	40:4	n_2 [1/min]	300,0	150,0	100,0	75,0	50,0	15,0
		P_{1N} [kW]	18,55	11,75	8,95	7,45	5,79	2,02
		T_{2N} [Nm]	555	703	803	882	1.006	1.095
		P_{1NT} [kW]	8,57	6,35	5,49	4,95	4,30	0,00
		Wirkungsgrad	0,94	0,94	0,94	0,93	0,91	0,85
13:1	52:4	n_2 [1/min]	230,0	115,0	76,0	57,0	38,0	11,0
		P_{1N} [kW]	11,09	6,09	4,30	3,37	2,37	0,85
		T_{2N} [Nm]	427	464	486	502	523	586
		P_{1NT} [kW]	7,87	5,73	4,92	4,43	3,85	0,00
		Wirkungsgrad	0,93	0,92	0,91	0,90	0,89	0,83
15:1	30:2	n_2 [1/min]	200,0	100,0	66,0	50,0	33,0	10,0
		P_{1N} [kW]	13,12	8,32	6,41	5,34	4,16	1,88
		T_{2N} [Nm]	564	715	817	898	1.025	1.386
		P_{1NT} [kW]	5,76	4,31	3,75	3,40	2,95	0,00
		Wirkungsgrad	0,90	0,90	0,89	0,88	0,86	0,77
20:1	40:2	n_2 [1/min]	150,0	75,0	50,0	37,0	25,0	7,5
		P_{1N} [kW]	10,84	6,87	5,28	4,45	3,47	1,49
		T_{2N} [Nm]	614	778	888	975	1.112	1.441
		P_{1NT} [kW]	5,44	3,99	3,44	3,10	2,69	0,00
		Wirkungsgrad	0,89	0,89	0,88	0,86	0,84	0,76

i	i ist		n_1 [1/min]					
			3000	1500	1000	750	500	150
26:1	52:2	n_2 [1/min]	115,0	57,0	38,0	28,0	19,0	5,8
		P_{1N} [kW]	7,63	4,20	3,00	2,38	1,72	0,64
		T_{2N} [Nm]	556	605	634	655	683	773
		P_{1NT} [kW]	4,94	3,57	3,06	2,75	2,40	0,00
		Wirkungsgrad	0,88	0,87	0,85	0,83	0,80	0,73
30:1	30:1	n_2 [1/min]	100,0	50,0	33,0	25,0	16,0	5,0
		P_{1N} [kW]	7,53	4,78	3,60	3,19	2,51	1,18
		T_{2N} [Nm]	590	748	825	950	1.080	1.437
		P_{1NT} [kW]	3,50	2,60	2,27	2,06	1,81	0,00
		Wirkungsgrad	0,82	0,82	0,80	0,78	0,75	0,64
40:1	40:1	n_2 [1/min]	75,0	37,0	25,0	18,0	12,0	3,8
		P_{1N} [kW]	6,33	4,01	3,13	2,65	2,13	1,00
		T_{2N} [Nm]	645	817	933	1.025	1.169	1.581
		P_{1NT} [kW]	3,32	2,42	2,09	1,90	1,67	0,00
		Wirkungsgrad	0,80	0,80	0,78	0,76	0,72	0,62
53:1	52:1	n_2 [1/min]	57,0	28,0	18,0	14,0	9,4	2,8
		P_{1N} [kW]	4,76	2,63	1,92	1,53	1,11	0,45
		T_{2N} [Nm]	615	670	704	728	762	870
		P_{1NT} [kW]	3,04	2,19	1,88	1,71	1,51	0,00
		Wirkungsgrad	0,78	0,77	0,74	0,72	0,69	0,59
62:1	63:1	n_2 [1/min]	48,0	24,0	16,0	12,0	8,1	2,4
		P_{1N} [kW]	4,59	2,91	2,17	1,70	1,21	0,44
		T_{2N} [Nm]	645	817	886	886	886	886
		P_{1NT} [kW]	2,39	1,74	1,52	1,39	1,24	0,00
		Wirkungsgrad	0,70	0,70	0,68	0,65	0,61	0,50
83:1	82:1	n_2 [1/min]	36,0	18,0	12,0	9,0	6,0	1,8
		P_{1N} [kW]	3,33	1,74	1,23	0,94	0,67	0,24
		T_{2N} [Nm]	591	599	599	599	599	599
		P_{1NT} [kW]	2,24	1,61	1,40	1,28	1,15	0,00
		Wirkungsgrad	0,68	0,66	0,62	0,61	0,57	0,47

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

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

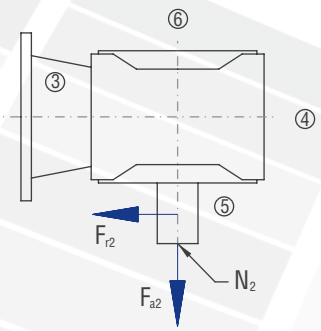
n_2 [rpm]	200		125		75		50		30		10	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 800	3650	1825	4000	2000	4750	2375	5600	2800	6700	3350	9500	4750
> 800	2920	1460	3200	1600	3800	1900	4480	2240	5360	2680	7600	3800

Inertia moments/mass

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

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

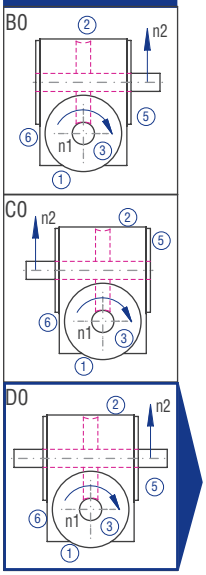
Mass ca. [kg]
55

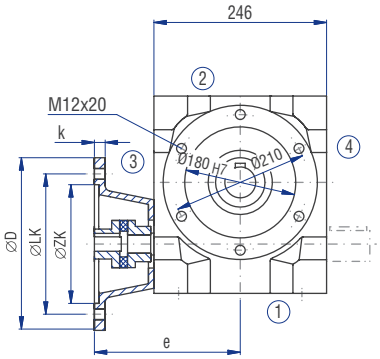


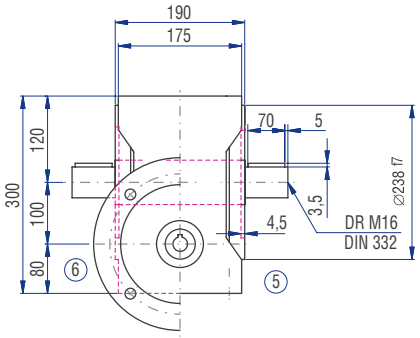
The mass of the gearbox may deviate depending on the flange size, the type and the gear ratio.

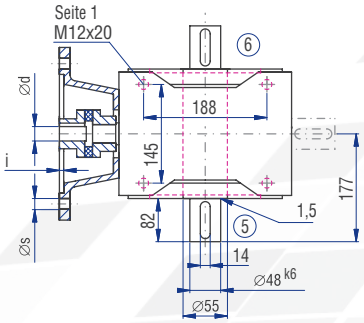
9.4.10 Type SL 100 – Type S with flange for motor mounting

Model

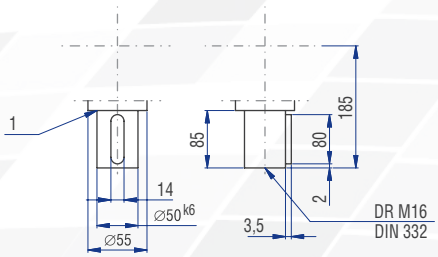




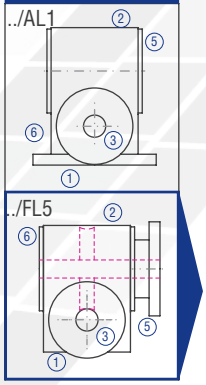


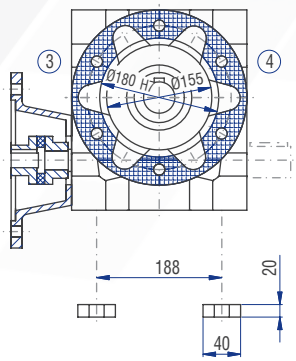


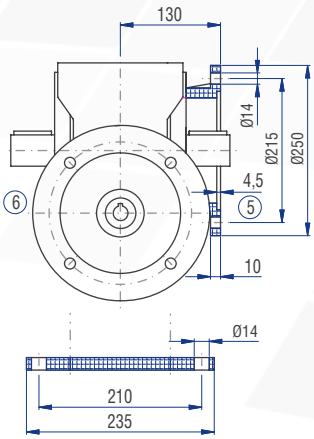
Implementation VV



Option

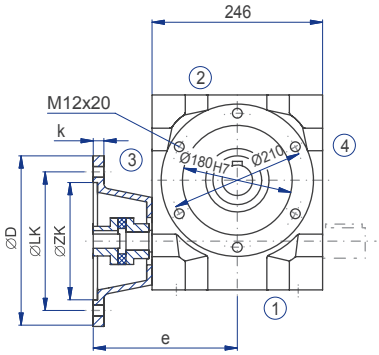


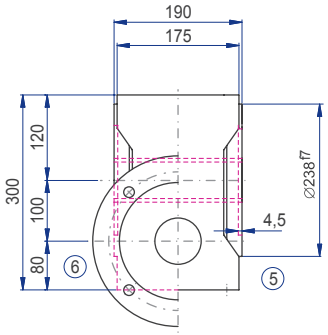


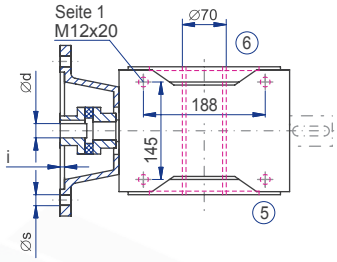


IEC motor	Model	Motor shaft (dxl)	Flange diameter D [mm]	LK [mm]	ZK [mm]	s [mm]	i [mm]	k [mm]	e [mm]
90	B5	24x50	200	165	130	M10	4	18	235
100	B5	28x60	250	215	180	14	5	18	245
112	B5	28x60	250	215	180	14	5	18	245
132	B5	38x80	300	265	230	14	5	18	265

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

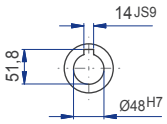


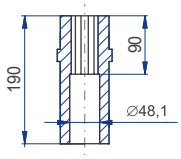


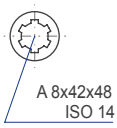


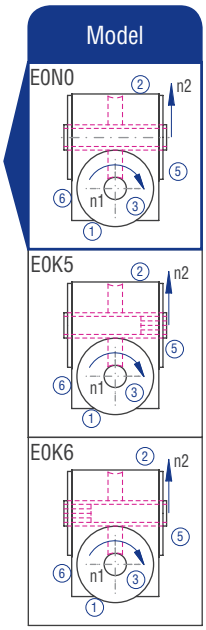
E0N0

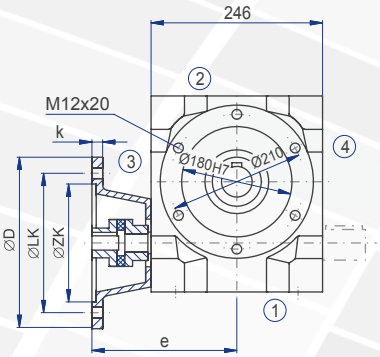
E0K5 / E0K6

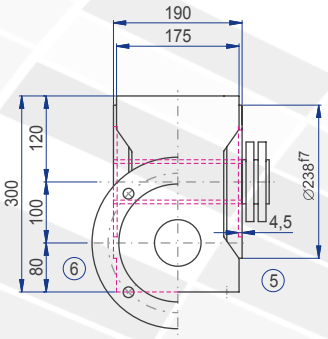


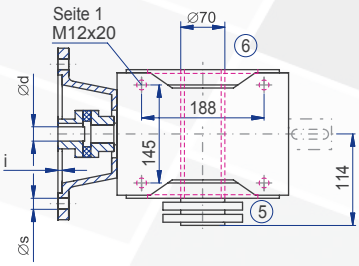


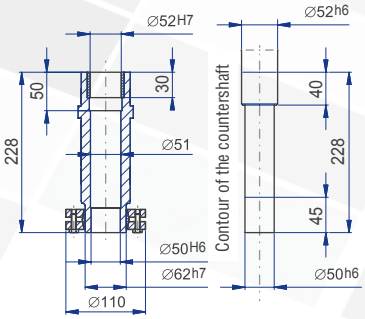


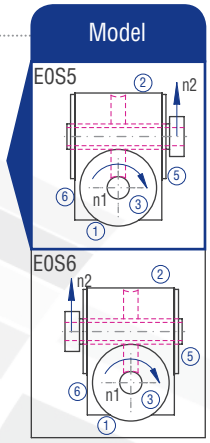




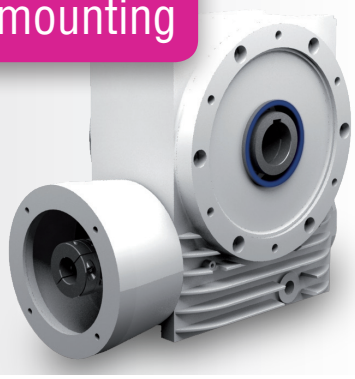








9.4.11 Type SL 125 – Type S with flange for motor mounting



Characteristics

Characteristic	Standard	Option
Toothing	Hardened and ground worm shaft / bronze worm gear	See chapter 9.2.1
Gear ratio	5:1 to 83:1	
Housing / Flanges	Grey cast iron	
Threaded mounting hole	On gearbox sides 1, 2 and on the flanges	See chapter 9.2.3
Shaft	Material 1 C45, shaft ends greased Fit with ISO j6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	Material: GGG grey cast iron; shafts greased Fit with ISO H7 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.3
Radial shaft seal ring	NBR, form A	See chapter 4.8
Ambient temperature	- 10°C to +90°C. The values of the performance tables are valid for 20°C	See chapter 4.9.3
Circumferential backlash	< 30 arcmin	See chapter 9.2.10
Protection class	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness > 40 µm	See chapter 4.4.1
Bearing life L10h	more than 15,000h	See chapter 4.9.1
Oil change intervals	Not required if the oil temperature is kept below 90°C. The lifetime of the bearings can be increased by the factor 1.5 if the oil is changed after the first 500 service hours and then every 5000 service hours.	See chapter 9.2.8
Lubricants	Synthetic lubricants	See chapter 9.2.8
Flange	Suited for the mounting of IEC motors, models IM B5 and B14	
Coupling	Three-piece claw coupling	

Performance data

i	i ist		n_1 [rpm]					
			3000	1500	1000	750	500	150
5:1	29:6	n_2 [rpm]	600.0	300.0	200.0	150.0	100.0	30.0
		P_{1N} [kW]	42.41	30.32	23.15	19.34	14.72	6.29
		T_{2N} [Nm]	626	895	1,025	1,130	1,290	1,760
		P_{1NT} [kW]	17.93	14.48	13.01	11.94	10.40	0.00
		Efficiency	0.96	0.96	0.96	0.95	0.95	0.91
7.5:1	29:4	n_2 [rpm]	400.0	200.0	133.0	100.0	66.0	20.0
		P_{1N} [kW]	35.71	22.49	17.13	14.13	11.03	4.96
		T_{2N} [Nm]	738	986	1,127	1,239	1,436	2,016
		P_{1NT} [kW]	14.40	11.53	10.31	9.44	8.20	0.00
		Efficiency	0.95	0.95	0.95	0.95	0.94	0.88
10:1	40:4	n_2 [rpm]	300.0	150.0	100.0	75.0	50.0	15.0
		P_{1N} [kW]	28.41	17.86	13.61	11.22	8.62	3.78
		T_{2N} [Nm]	850	1,069	1,222	1,343	1,532	2,092
		P_{1NT} [kW]	13.62	10.68	9.41	8.54	7.37	0.00
		Efficiency	0.94	0.94	0.94	0.94	0.93	0.87
13:1	52:4	n_2 [rpm]	230.0	115.0	76.0	57.0	38.0	11.0
		P_{1N} [kW]	18.19	10.02	7.00	5.42	3.86	1.37
		T_{2N} [Nm]	700	763	800	826	862	966
		P_{1NT} [kW]	12.83	9.84	8.56	7.72	6.65	0.00
		Efficiency	0.93	0.92	0.92	0.92	0.90	0.85
15:1	29:2	n_2 [rpm]	200.0	100.0	66.0	50.0	33.0	10.0
		P_{1N} [kW]	20.06	12.61	10.01	8.88	6.91	3.21
		T_{2N} [Nm]	862	1,084	1,290	1,510	1,743	2,423
		P_{1NT} [kW]	9.13	7.24	6.44	5.88	5.10	0.00
		Efficiency	0.90	0.90	0.90	0.89	0.88	0.79
20:1	40:2	n_2 [rpm]	150.0	75.0	50.0	37.0	25.0	7.5
		P_{1N} [kW]	16.59	10.44	7.95	6.74	5.23	2.33
		T_{2N} [Nm]	940	1,183	1,352	1,510	1,717	2,310
		P_{1NT} [kW]	8.61	6.68	5.86	5.31	4.58	0.00
		Efficiency	0.89	0.89	0.89	0.88	0.86	0.78

i	i ist		n_1 [rpm]					
			3000	1500	1000	750	500	150
26:1	52:2	n_2 [rpm]	115.0	57.0	38.0	28.0	19.0	5.8
		P_{1N} [kW]	12.76	7.03	4.97	3.90	2.78	1.04
		T_{2N} [Nm]	929	1,012	1,062	1,097	1,146	1,294
		P_{1NT} [kW]	8.09	6.14	5.32	4.80	4.14	0.00
		Efficiency	0.88	0.87	0.86	0.85	0.83	0.75
30:1	30:1	n_2 [rpm]	100.0	50.0	33.0	25.0	16.0	5.0
		P_{1N} [kW]	11.76	7.49	6.38	5.65	4.52	1.86
		T_{2N} [Nm]	901	1,134	1,448	1,690	1,952	2,270
		P_{1NT} [kW]	5.50	4.31	3.83	3.51	3.08	0.00
		Efficiency	0.83	0.82	0.82	0.81	0.78	0.66
40:1	40:1	n_2 [rpm]	75.0	37.0	25.0	18.0	12.0	3.8
		P_{1N} [kW]	9.57	6.10	4.81	4.25	3.35	1.42
		T_{2N} [Nm]	987	1,242	1,470	1,690	1,922	2,310
		P_{1NT} [kW]	5.22	4.00	3.52	3.20	2.79	0.00
		Efficiency	0.81	0.80	0.80	0.78	0.75	0.64
53:1	52:1	n_2 [rpm]	57.0	28.0	18.0	14.0	9.4	2.8
		P_{1N} [kW]	7.93	4.44	3.15	2.48	1.83	0.73
		T_{2N} [Nm]	1,037	1,132	1,189	1,230	1,289	1,470
		P_{1NT} [kW]	4.93	3.71	3.23	2.93	2.56	0.00
		Efficiency	0.79	0.77	0.76	0.75	0.71	0.61
62:1	62:1	n_2 [rpm]	48.0	24.0	16.0	12.0	8.1	2.4
		P_{1N} [kW]	6.86	4.37	3.38	2.87	2.25	0.84
		T_{2N} [Nm]	988	1,243	1,421	1,562	1,731	1,731
		P_{1NT} [kW]	3.75	2.86	2.52	2.32	2.05	0.00
		Efficiency	0.73	0.72	0.71	0.69	0.65	0.52
83:1	83:1	n_2 [rpm]	36.0	18.0	12.0	9.0	6.0	1.8
		P_{1N} [kW]	5.72	3.30	2.23	1.73	1.23	0.46
		T_{2N} [Nm]	1,043	1,167	1,167	1,167	1,167	1,167
		P_{1NT} [kW]	3.55	2.66	2.33	2.13	1.89	0.00
		Efficiency	0.69	0.67	0.66	0.64	0.60	0.48

	5:1	7.5:1	10:1	13:1	15:1	20:1	26:1	30:1	40:1	53:1	62:1	83:1
T_{2max} [Nm]	2250	2250	2250	1190	2250	2392	1630	2270	2320	1810	2010	1950

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

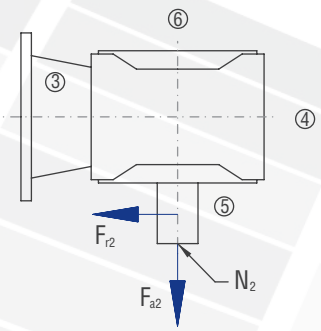
n_2 [rpm]	200		125		75		50		30		10	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 1300	4700	2350	5300	2650	6300	3150	7500	3750	9000	4500	11000	5500
> 1300	3760	1880	4240	2120	5040	2520	6000	3000	7200	3600	8800	4400

Inertia moments/mass

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

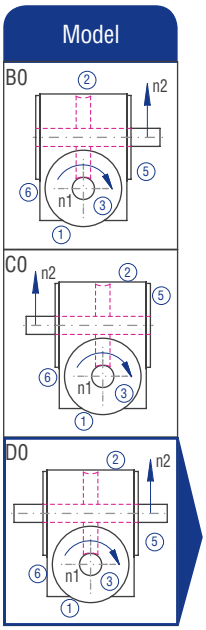
	Inertia moment [kgcm²]											
	5:1	7.5:1	10:1	13:1	15:1	20:1	26:1	30:1	40:1	53:1	62:1	83:1
J1	50.02	43.96	34.83	30.79	40.32	32.18	28.96	39.42	31.51	28.50	33.31	29.29

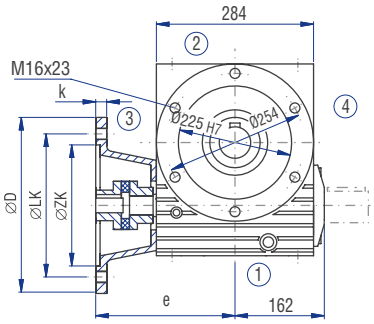
Mass ca. [kg]
85

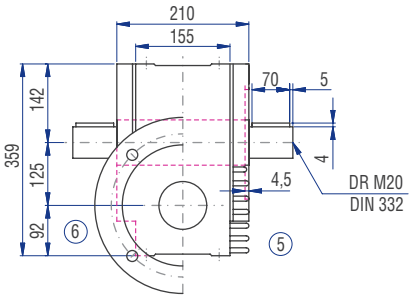


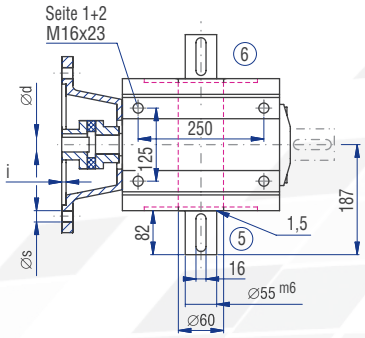
The mass of the gearbox may deviate depending on the flange size, the type and the gear ratio.

9.4.11 Type SL 125 – Type S with flange for motor mounting

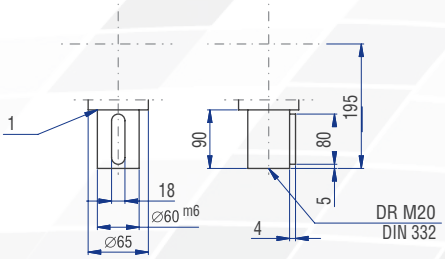


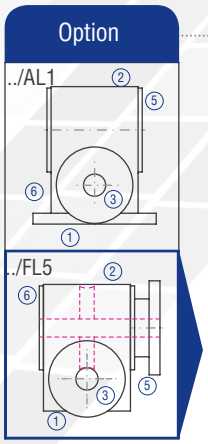


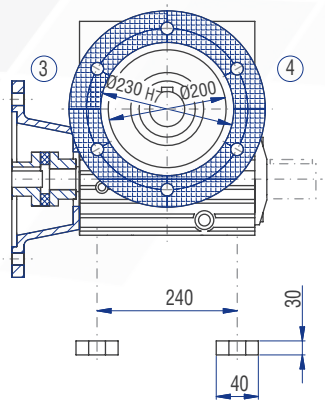


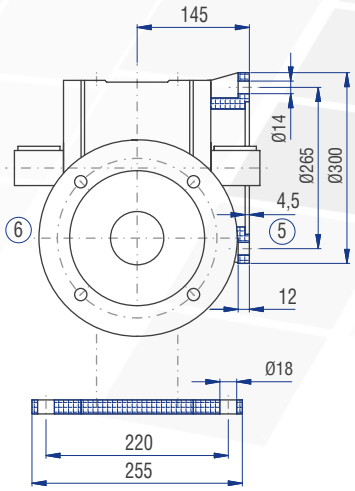


Implementation VV



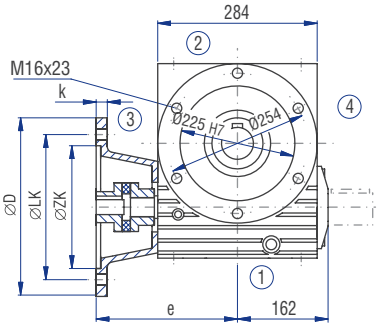


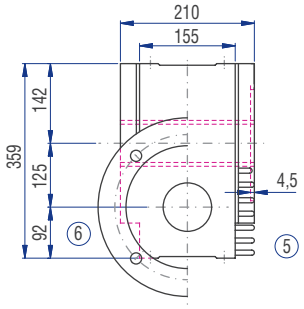


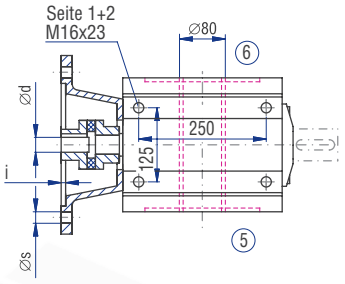


IEC motor	Model	Motor shaft (dxl)	Flange diameter D [mm]	LK [mm]	ZK [mm]	s [mm]	i [mm]	k [mm]	e [mm]
90	B5	24x50	200	165	130	M10	4	18	257
100	B5	28x60	250	215	180	14	5	18	267
112	B5	28x60	250	215	180	14	5	18	267
132	B5	38x80	300	265	230	14	5	18	287
160	B5	42x110	350	300	250	18	6	18	327

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

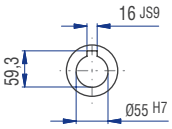


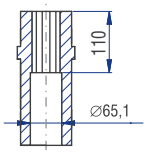


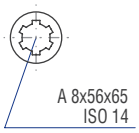


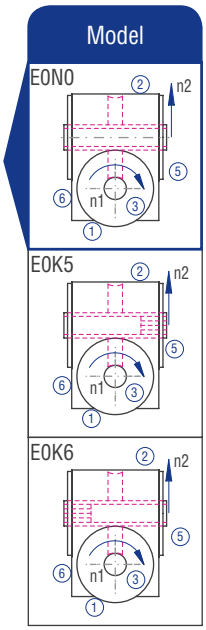
E0N0

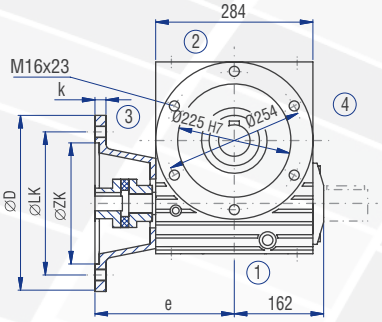
E0K5 / E0K6

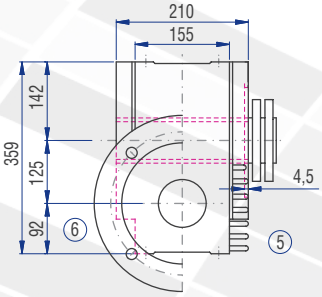


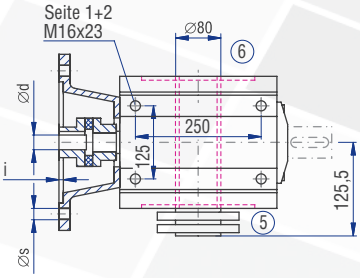


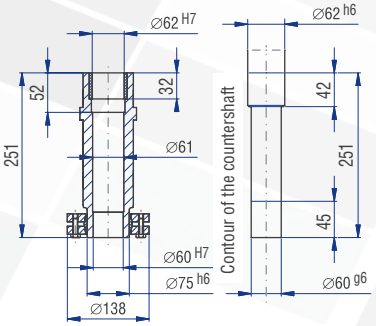


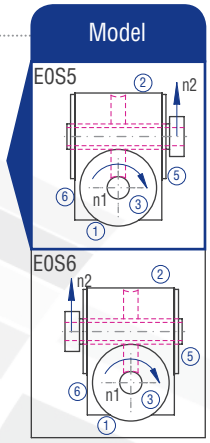




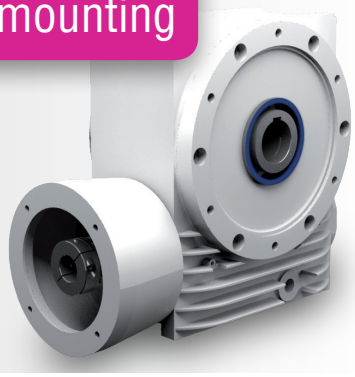








9.4.12 Type SL 160 – Type S with flange for motor mounting



Characteristics

Characteristic	Standard	Option
Toothing	Hardened and ground worm shaft / bronze worm gear	See chapter 9.2.1
Gear ratio	5:1 to 83:1	
Housing / Flanges	Grey cast iron	
Threaded mounting hole	On gearbox sides 1, 2 and on the flanges	See chapter 9.2.3
Shaft	Material 1 C45, shaft ends greased Fit with ISO j6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	Material: GGG grey cast iron; shafts greased Fit with ISO H7 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.3
Radial shaft seal ring	NBR, form A	See chapter 4.8
Ambient temperature	- 10°C to +90°C. The values of the performance tables are valid for 20°C	See chapter 4.9.3
Circumferential backlash	< 30 arcmin	See chapter 9.2.10
Protection class	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness > 40 µm	See chapter 4.4.1
Bearing life L10h	more than 15,000h	See chapter 4.9.1
Oil change intervals	Not required if the oil temperature is kept below 90°C. The lifetime of the bearings can be increased by the factor 1.5 if the oil is changed after the first 500 service hours and then every 5000 service hours.	See chapter 9.2.8
Lubricants	Synthetic lubricants	See chapter 9.2.8
Flange	Suited for the mounting of IEC motors, models IM B5 and B14	
Coupling	Three-piece claw coupling	

Performance data

i	i ist		n_1 [rpm]					
			3000	1500	1000	750	500	150
5:1	30:6	n_2 [rpm]		300.0	200.0	150.0	100.0	30.0
		P_{1N} [kW]		53.11	40.37	33.38	24.58	9.96
		T_{2N} [Nm]		1,640	1,870	2,040	2,230	2,950
		P_{1NT} [kW]		25.20	23.42	21.89	19.33	0.00
		Efficiency		0.97	0.97	0.96	0.95	0.93
7.5:1	30:4	n_2 [rpm]	400.0	200.0	133.0	100.0	66.0	20.0
		P_{1N} [kW]	43.91	39.53	29.83	24.94	20.05	9.34
		T_{2N} [Nm]	996	1,793	2,051	2,263	2,729	4,013
		P_{1NT} [kW]	23.14	20.07	18.56	17.28	15.18	0.00
		Efficiency	0.95	0.95	0.96	0.95	0.95	0.90
10:1	40:4	n_2 [rpm]	300.0	150.0	100.0	75.0	50.0	15.0
		P_{1N} [kW]	51.25	32.26	24.59	20.28	15.60	6.98
		T_{2N} [Nm]	1,550	1,951	2,231	2,453	2,800	3,909
		P_{1NT} [kW]	22.09	18.76	17.04	15.66	13.57	0.00
		Efficiency	0.95	0.95	0.95	0.95	0.94	0.88
13:1	54:4	n_2 [rpm]	230.0	115.0	76.0	57.0	38.0	11.0
		P_{1N} [kW]	36.29	19.80	13.87	10.87	7.66	2.73
		T_{2N} [Nm]	1,466	1,600	1,681	1,738	1,810	2,041
		P_{1NT} [kW]	20.77	17.24	15.41	14.02	12.06	0.00
		Efficiency	0.94	0.94	0.94	0.93	0.92	0.87
15:1	30:2	n_2 [rpm]	200.0	100.0	66.0	50.0	33.0	10.0
		P_{1N} [kW]	29.82	22.42	18.10	16.22	12.88	6.17
		T_{2N} [Nm]	1,310	1,970	2,386	2,820	3,320	4,830
		P_{1NT} [kW]	14.64	12.55	11.55	10.73	9.40	0.00
		Efficiency	0.92	0.92	0.92	0.91	0.90	0.82
20:1	40:2	n_2 [rpm]	150.0	75.0	50.0	37.0	25.0	7.5
		P_{1N} [kW]	29.60	18.83	14.35	12.43	9.80	4.49
		T_{2N} [Nm]	1,715	2,158	2,467	2,850	3,294	4,576
		P_{1NT} [kW]	13.95	11.70	10.58	9.70	8.39	0.00
		Efficiency	0.91	0.90	0.90	0.90	0.88	0.80

i	i ist		n_1 [rpm]					
			3000	1500	1000	750	500	150
26:1	54:2	n_2 [rpm]	115.0	57.0	38.0	28.0	19.0	5.8
		P_{1N} [kW]	23.70	13.88	9.83	7.63	5.44	2.06
		T_{2N} [Nm]	1,813	2,124	2,231	2,307	2,413	2,727
		P_{1NT} [kW]	13.07	10.71	9.53	8.66	7.45	0.00
		Efficiency	0.89	0.89	0.88	0.88	0.86	0.77
30:1	30:1	n_2 [rpm]	100.0	50.0	33.0	25.0	16.0	5.0
		P_{1N} [kW]	20.44	13.53	11.13	9.85	8.02	3.41
		T_{2N} [Nm]	1,640	2,170	2,678	3,160	3,720	4,500
		P_{1NT} [kW]	8.79	7.39	6.79	6.31	5.57	0.00
		Efficiency	0.84	0.84	0.84	0.84	0.81	0.69
40:1	40:1	n_2 [rpm]	75.0	37.0	25.0	18.0	12.0	3.8
		P_{1N} [kW]	17.04	10.73	8.73	7.73	6.11	2.90
		T_{2N} [Nm]	1,801	2,267	2,735	3,190	3,688	4,952
		P_{1NT} [kW]	8.41	6.92	6.25	5.76	5.02	0.00
		Efficiency	0.83	0.83	0.82	0.81	0.79	0.67
53:1	54:1	n_2 [rpm]	57.0	28.0	18.0	14.0	9.4	2.8
		P_{1N} [kW]	13.62	8.52	6.05	4.81	3.50	1.40
		T_{2N} [Nm]	1,896	2,372	2,494	2,582	2,708	3,091
		P_{1NT} [kW]	7.93	6.39	5.69	5.19	4.52	0.00
		Efficiency	0.81	0.81	0.80	0.78	0.75	0.64
62:1	63:1	n_2 [rpm]	48.0	24.0	16.0	12.0	8.1	2.4
		P_{1N} [kW]	11.97	7.53	5.82	4.86	3.83	1.61
		T_{2N} [Nm]	1,800	2,266	2,591	2,848	3,225	3,552
		P_{1NT} [kW]	6.00	4.87	4.42	4.09	3.63	0.00
		Efficiency	0.75	0.75	0.74	0.73	0.70	0.55
83:1	84:1	n_2 [rpm]	36.0	18.0	12.0	9.0	6.0	1.8
		P_{1N} [kW]	9.76	6.10	4.18	3.18	2.25	0.74
		T_{2N} [Nm]	1,906	2,347	2,347	2,347	2,347	2,347
		P_{1NT} [kW]	5.72	4.55	4.07	3.74	3.31	0.00
		Efficiency	0.73	0.72	0.70	0.69	0.65	0.59

	5:1	7.5:1	10:1	13:1	15:1	20:1	26:1	30:1	40:1	53:1	62:1	83:1
T_{2max} [Nm]	4450	4450	4780	2410	4550	5050	3345	4500	5120	3700	3900	4050

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

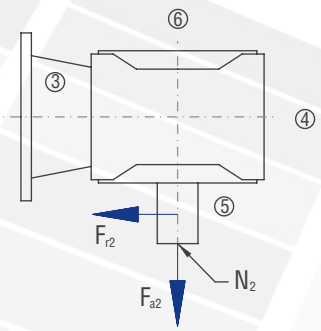
n_2 [rpm]	200		125		75		50		30		10	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 2300	5600	2800	6800	3400	7600	3800	8600	4300	10200	5100	13600	6800
> 2300	4670	2335	5670	2835	6330	3165	7170	3585	8500	4250	11300	5650

Inertia moments/mass

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

	Inertia moment [kgcm²]											
	5:1	7.5:1	10:1	13:1	15:1	20:1	26:1	30:1	40:1	53:1	62:1	83:1
J1	176.14	137.49	97.13	75.81	114.31	84.22	71.53	108.51	80.99	70.50	86.78	72.75

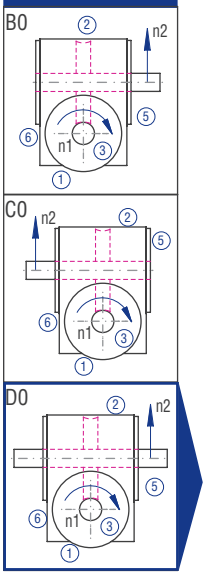
Mass ca. [kg]
157

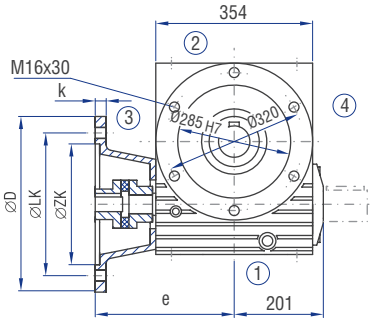


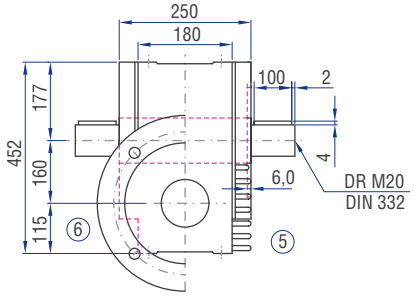
The mass of the gearbox may deviate depending on the flange size, the type and the gear ratio.

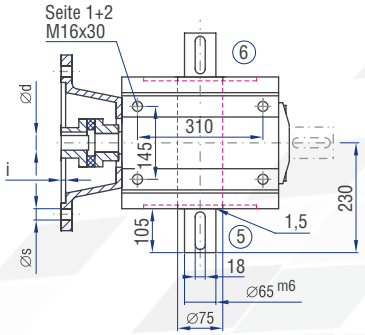
9.4.12 Type SL 160 – Type S with flange for motor mounting

Model

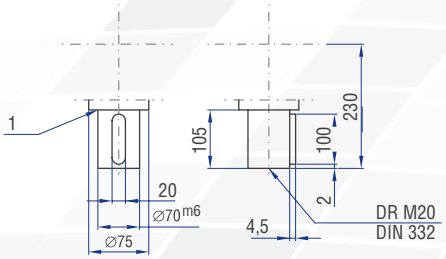




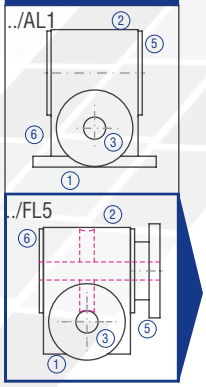


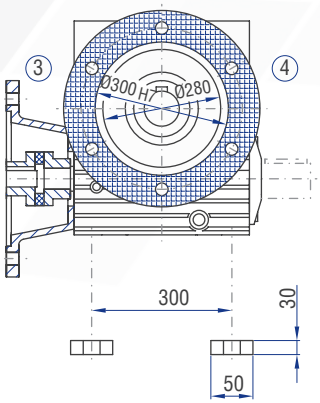


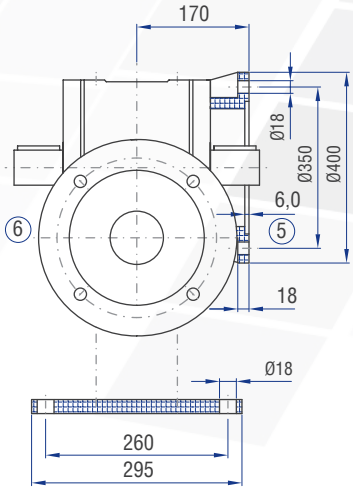
Implementation VV



Option

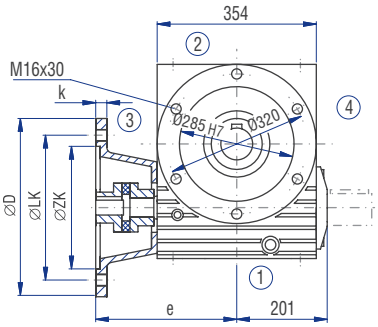


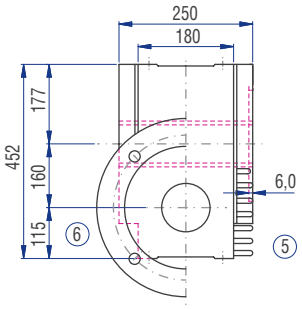




IEC motor	Model	Motor shaft (dxl)	Flange diameter D [mm]	LK [mm]	ZK [mm]	s [mm]	i [mm]	k [mm]	e [mm]
100	B5	28x60	250	215	180	M12	5	18	310
112	B5	28x60	250	215	180	M12	5	18	310
132	B5	38x80	300	265	230	14	5	18	340
160	B5	42x110	350	300	250	18	6	18	370
180	B5	48x110	350	300	250	18	6	18	370

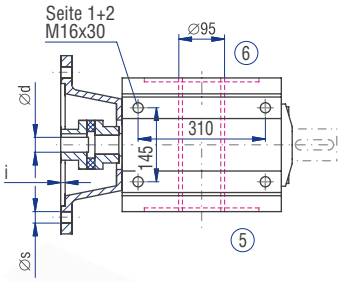
The dimensions of the Models not shown can be figured by mirroring available dimensions.

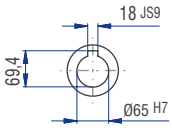


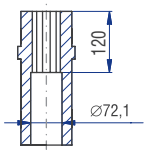


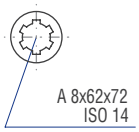
E0N0

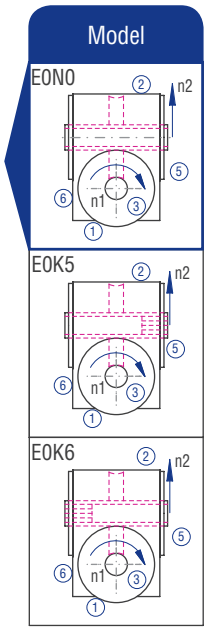
E0K5 / E0K6

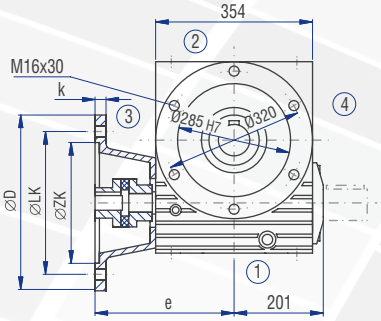


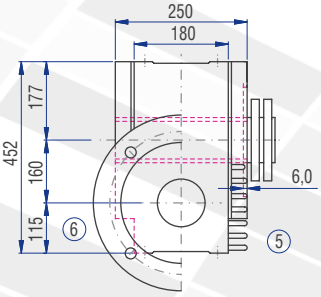


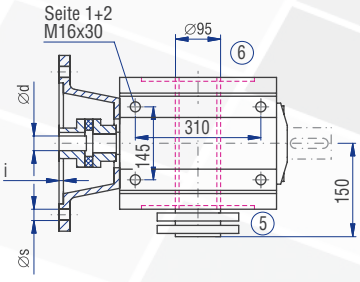


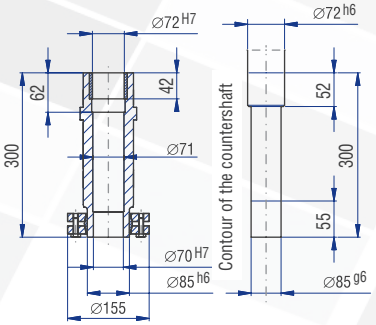


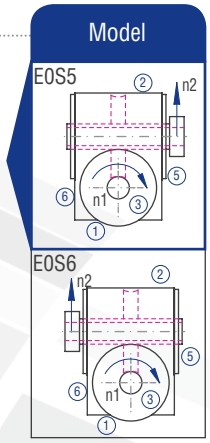




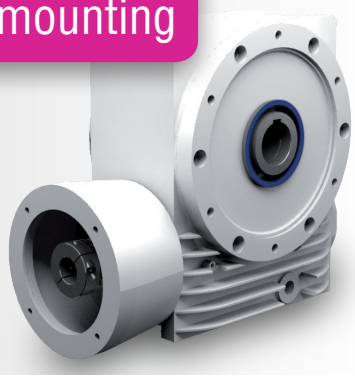








9.4.13 Type SL 200 – Type S with flange for motor mounting



Characteristics

Characteristic	Standard	Option
Toothing	Hardened and ground worm shaft / bronze worm gear	See chapter 9.2.1
Gear ratio	5:1 to 83:1	
Housing / Flanges	Grey cast iron	
Threaded mounting hole	On gearbox sides 1, 2 and on the flanges	See chapter 9.2.3
Shaft	Material 1 C45, shaft ends greased Fit with ISO j6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	Material: GGG grey cast iron; shafts greased Fit with ISO H7 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.3
Radial shaft seal ring	NBR, form A	See chapter 4.8
Ambient temperature	- 10°C to +90°C. The values of the performance tables are valid for 20°C	See chapter 4.9.3
Circumferential backlash	< 30 arcmin	See chapter 9.2.10
Protection class	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness > 40 µm	See chapter 4.4.1
Bearing life L10h	more than 15,000h	See chapter 4.9.1
Oil change intervals	Not required if the oil temperature is kept below 90°C. The lifetime of the bearings can be increased by the factor 1.5 if the oil is changed after the first 500 service hours and then every 5000 service hours.	See chapter 9.2.8
Lubricants	Synthetic lubricants	See chapter 9.2.8
Flange	Suited for the mounting of IEC motors, models IM B5 and B14	
Coupling	Three-piece claw coupling	

Performance data

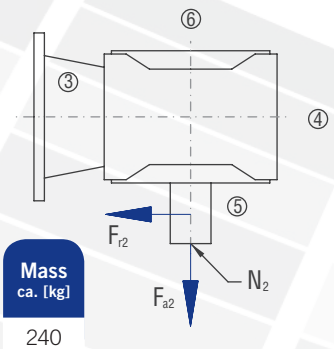
i	i ist		n_1 [rpm]					
			3000	1500	1000	750	500	150
5:1	30:6	n_2 [rpm]		300.0	200.0	150.0	100.0	30.0
		P_{1N} [kW]		84.20	64.77	55.30	41.45	18.05
		T_{2N} [Nm]		260	3,000	3,380	3,800	5,400
		P_{1NT} [kW]		41.80	40.25	38.36	34.49	0.00
		Efficiency		0.97	0.97	0.96	0.96	0.94
7.5:1	30:4	n_2 [rpm]		200.0	133.0	100.0	66.0	20.0
		P_{1N} [kW]		62.59	50.68	44.55	36.26	17.32
		T_{2N} [Nm]		2,869	3,485	4,084	4,987	7,607
		P_{1NT} [kW]		33.51	32.09	30.44	27.20	0.00
		Efficiency		0.96	0.96	0.96	0.96	0.92
10:1	40:4	n_2 [rpm]		150.0	100.0	75.0	50.0	15.0
		P_{1N} [kW]		50.86	38.38	32.92	26.73	12.45
		T_{2N} [Nm]		3,076	3,519	4,024	4,851	7,134
		P_{1NT} [kW]		30.91	29.22	27.42	24.16	0.00
		Efficiency		0.95	0.96	0.96	0.95	0.90
13:1	53:4	n_2 [rpm]	230.0	115.0	76.0	57.0	38.0	11.0
		P_{1N} [kW]	64.74	40.74	31.06	24.46	17.27	6.24
		T_{2N} [Nm]	2,594	3,265	3,734	3,921	4,109	4,633
		P_{1NT} [kW]	31.35	28.70	26.62	24.63	21.36	0.00
		Efficiency	0.95	0.95	0.95	0.95	0.94	0.88
15:1	30:2	n_2 [rpm]		100.0	66.0	50.0	33.0	10.0
		P_{1N} [kW]		39.27	32.34	28.88	23.23	11.50
		T_{2N} [Nm]		3,450	4,308	5,130	6,122	9,244
		P_{1NT} [kW]		20.99	20.00	18.92	16.85	0.00
		Efficiency		0.92	0.93	0.93	0.92	0.84
20:1	40:2	n_2 [rpm]	150.0	75.0	50.0	37.0	25.0	7.5
		P_{1N} [kW]	42.29	29.60	24.14	21.62	17.17	8.22
		T_{2N} [Nm]	2,450	3,430	4,241	5,010	5,902	8,587
		P_{1NT} [kW]	20.87	19.21	18.07	16.92	14.86	0.00
		Efficiency	0.91	0.91	0.92	0.91	0.90	0.82

i	i ist		n_1 [rpm]					
			3000	1500	1000	750	500	150
26:1	53:2	n_2 [rpm]	115.0	57.0	38.0	28.0	19.0	5.8
		P_{1N} [kW]	37.80	23.79	18.40	14.95	11.51	4.58
		T_{2N} [Nm]	2,870	3,612	4,190	4,540	5,184	6,177
		P_{1NT} [kW]	19.73	17.77	16.41	15.15	13.12	0.00
		Efficiency	0.90	0.90	0.90	0.90	0.89	0.80
30:1	30:1	n_2 [rpm]		50.0	33.0	25.0	16.0	5.0
		P_{1N} [kW]		23.74	19.73	17.62	14.33	7.43
		T_{2N} [Nm]		3,900	4,862	5,790	6,896	10,356
		P_{1NT} [kW]		12.29	11.65	11.03	9.86	0.00
		Efficiency		0.86	0.86	0.86	0.84	0.73
40:1	40:1	n_2 [rpm]	75.0	37.0	25.0	18.0	12.0	3.8
		P_{1N} [kW]	23.93	18.04	14.66	13.14	10.56	5.58
		T_{2N} [Nm]	2,560	3,860	4,761	5,620	6,613	9,942
		P_{1NT} [kW]	12.58	11.27	10.56	9.89	8.75	0.00
		Efficiency	0.84	0.84	0.85	0.84	0.82	0.70
53:1	53:1	n_2 [rpm]	57.0	28.0	18.0	14.0	9.4	2.8
		P_{1N} [kW]	21.71	13.99	11.19	9.40	6.79	3.09
		T_{2N} [Nm]	3,003	3,870	4,701	5,200	5,428	6,985
		P_{1NT} [kW]	11.96	10.48	9.65	8.93	7.81	0.00
		Efficiency	0.82	0.82	0.83	0.82	0.79	0.67
62:1	63:1	n_2 [rpm]	48.0	24.0	16.0	12.0	8.1	2.4
		P_{1N} [kW]	18.60	11.56	8.81	7.36	5.84	2.99
		T_{2N} [Nm]	2,835	3,569	4,081	4,488	5,128	6,946
		P_{1NT} [kW]	8.90	7.77	7.28	6.85	6.14	0.00
		Efficiency	0.76	0.77	0.77	0.76	0.73	0.58
83:1	83:1	n_2 [rpm]	36.0	18.0	12.0	9.0	6.0	1.8
		P_{1N} [kW]	15.43	9.58	7.31	6.06	4.21	1.61
		T_{2N} [Nm]	3,016	3,797	4,343	4,675	4,675	4,675
		P_{1NT} [kW]	8.61	7.38	6.80	6.34	5.62	0.00
		Efficiency	0.74	0.75	0.75	0.73	0.70	0.55

	5:1	7.5:1	10:1	13:1	15:1	20:1	26:1	30:1	40:1	53:1	62:1	83:1
T_{2max} [Nm]	8500	9800	9277	5396	10500	10000	6790	10500	9800	7500	7000	6800

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

n_2 [rpm]	200		125		75		50		30		10	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 5000	7500	3750	9300	4650	10300	5150	11500	5750	13500	6750	18000	9000
> 5000	6600	3300	8100	4050	9000	4500	10000	5000	11700	5850	15700	7850



Inertia moments/mass

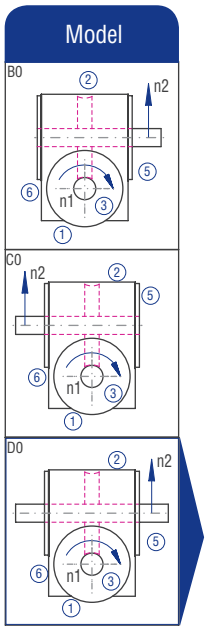
Inertia moment J_1 related to the fast-rotating shaft (N_1)

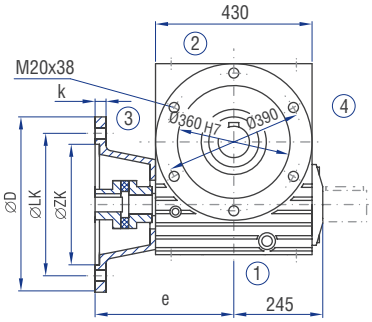
	Inertia moment [kgcm²]											
	5:1	7.5:1	10:1	13:1	15:1	20:1	26:1	30:1	40:1	53:1	62:1	83:1
J1	442.35	316.53	224.31	116.30	241.04	178.87	140.61	222.16	167.51	134.11	186.32	140.89

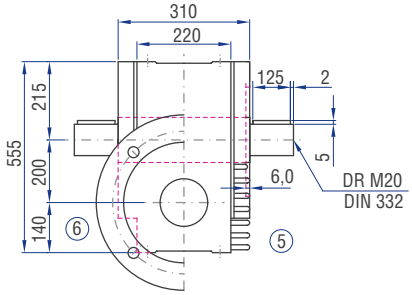
Mass ca. [kg]
240

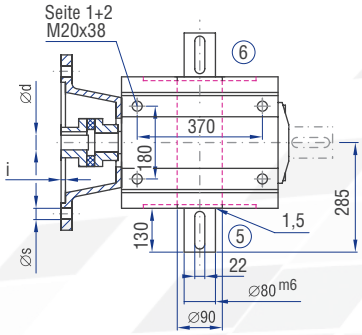
The mass of the gearbox may deviate depending on the flange size, the type and the gear ratio.

9.4.13 Type SL 200 – Type S with flange for motor mounting

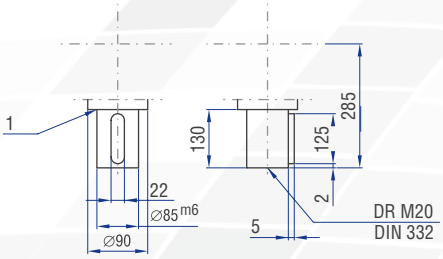


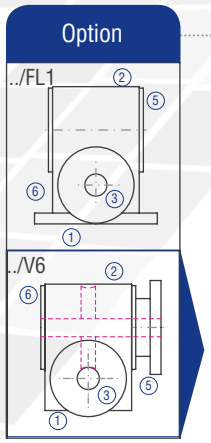


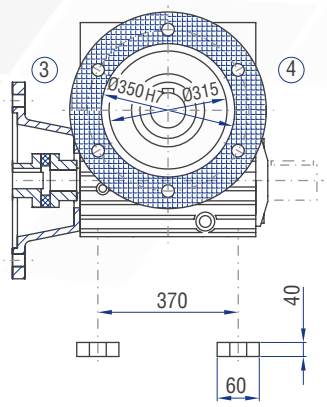


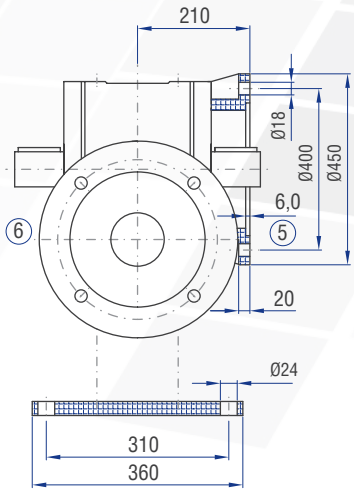


Implementation VV



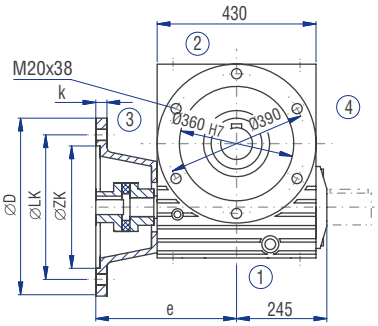


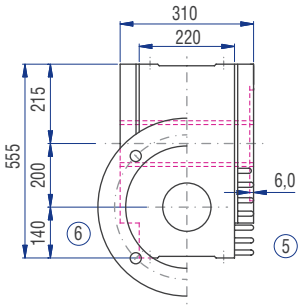


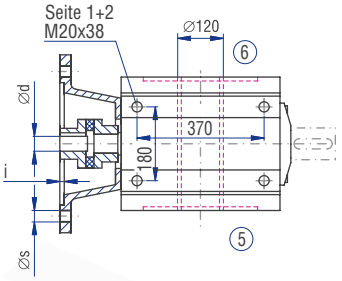


IEC motor	Model	Motor shaft (dxl)	Flange diameter D [mm]	LK [mm]	ZK [mm]	s [mm]	i [mm]	k [mm]	e [mm]
132	B5	38x80	300	265	230	14	5	18	382
160	B5	42x110	350	300	250	18	6	18	415
180	B5	48x110	350	300	250	18	6	18	415
200	B5	55x110	400	350	300	18	6	18	435

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

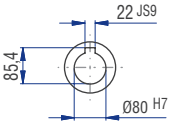


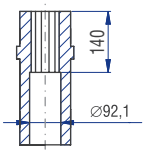


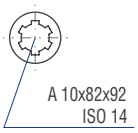


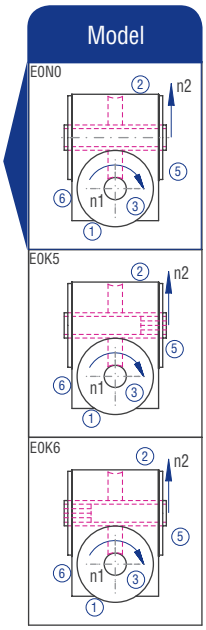
E0N0

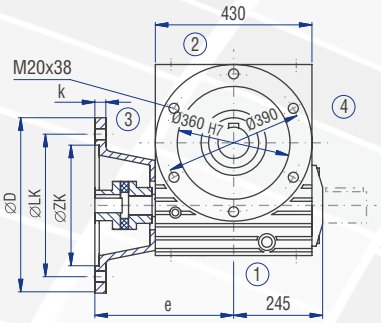
E0K5 / E0K6

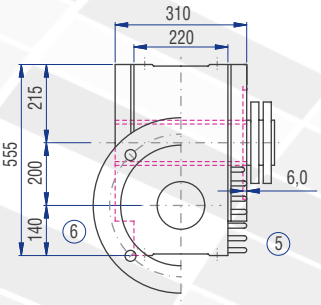


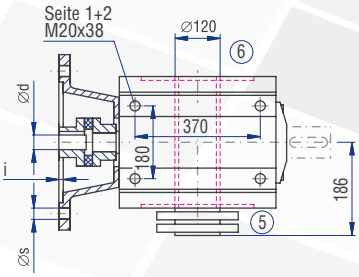


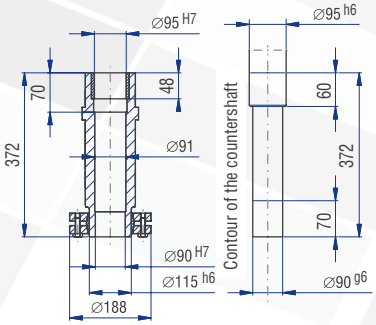


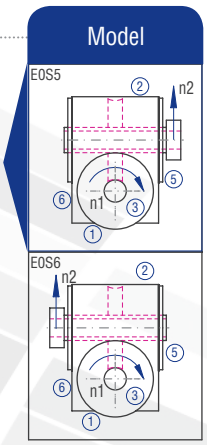




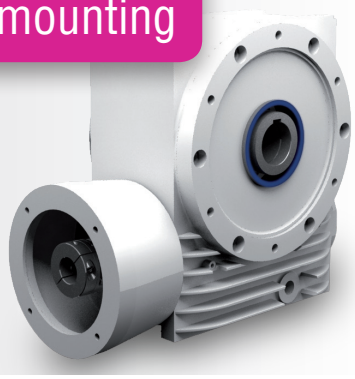








9.4.14 Type SL 250 – Type S with flange for motor mounting



Characteristics

Characteristic	Standard	Option
Toothing	Hardened and ground worm shaft / bronze worm gear	See chapter 9.2.1
Gear ratio	7.5:1 to 83:1	
Housing / Flanges	Grey cast iron	
Threaded mounting hole	On gearbox sides 1, 2 and on the flanges	See chapter 9.2.3
Shaft	Material 1 C45, shaft ends greased Fit with ISO j6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	Material: GGG grey cast iron; shafts greased Fit with ISO H7 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.3
Radial shaft seal ring	NBR, form A	See chapter 4.8
Ambient temperature	- 10°C to +90°C. The values of the performance tables are valid for 20°C	See chapter 4.9.3
Circumferential backlash	< 30 arcmin	See chapter 9.2.10
Protection class	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness > 40 µm	See chapter 4.4.1
Bearing life L10h	more than 15,000h	See chapter 4.9.1
Oil change intervals	Not required if the oil temperature is kept below 90°C. The lifetime of the bearings can be increased by the factor 1.5 if the oil is changed after the first 500 service hours and then every 5000 service hours.	See chapter 9.2.8
Lubricants	Synthetic lubricants	See chapter 9.2.8
Flange	Suited for the mounting of IEC motors, models IM B5 and B14	
Coupling	Three-piece claw coupling	

Performance data

i	i ist		n_1 [rpm]				
			1500	1000	750	500	150
7.5:1	31:4	n_2 [rpm]	200.0	133.0	100.0	66.0	20.0
		P_{1N} [kW]	140.64	111.12	90.87	68.37	29.86
		T_{2N} [Nm]	6,514	7,720	9,418	9,500	13,260
		P_{1NT} [kW]	78.13	69.45	60.58	52.59	0.00
		Efficiency	0.97	0.97	0.97	0.97	0.93
10:1	40:4	n_2 [rpm]	150.0	100.0	75.0	50.0	15.0
		P_{1N} [kW]	118.29	89.06	72.81	54.79	54.79
		T_{2N} [Nm]	7,230	8,165	8,900	10,047	10,047
		P_{1NT} [kW]	73.93	68.51	60.67	49.81	0.00
		Efficiency	0.96	0.96	0.96	0.96	0.96
13:1	52:4	n_2 [rpm]	115.0	76.0	57.0	38.0	11.0
		P_{1N} [kW]	93.66	69.15	53.77	38.02	13.65
		T_{2N} [Nm]	7,485	9,400	8,709	9,140	10,360
		P_{1NT} [kW]	66.90	62.86	53.77	47.52	0.00
		Efficiency	0.96	0.96	0.96	0.95	0.90
15:1	31:2	n_2 [rpm]	100.0	66.0	50.0	33.0	10.0
		P_{1N} [kW]	74.97	59.15	48.35	36.78	15.39
		T_{2N} [Nm]	6,730	7,965	8,680	9,800	12,790
		P_{1NT} [kW]	41.65	36.97	32.23	26.27	0.00
		Efficiency	0.94	0.94	0.94	0.93	0.87
20:1	40:2	n_2 [rpm]	75.0	50.0	37.0	25.0	7.5
		P_{1N} [kW]	62.89	47.35	38.71	29.46	12.68
		T_{2N} [Nm]	7,447	9,410	9,168	10,352	13,720
		P_{1NT} [kW]	41.92	36.42	29.78	26.78	0.00
		Efficiency	0.93	0.93	0.93	0.92	0.85

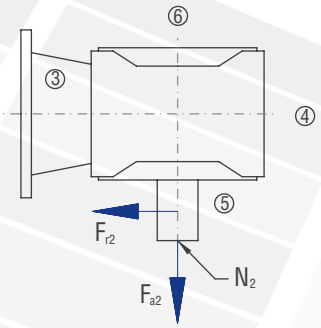
i	i ist		n_1 [rpm]				
			1500	1000	750	500	150
26:1	52:2	n_2 [rpm]	57.0	38.0	28.0	19.0	5.8
		P_{1N} [kW]	50.28	37.84	30.92	23.54	9.92
		T_{2N} [Nm]	7,805	8,810	9,600	10,844	13,720
		P_{1NT} [kW]	36.68	34.40	30.92	29.43	0.00
		Efficiency	0.92	0.92	0.92	0.91	0.82
30:1	31:1	n_2 [rpm]	50.0	33.0	25.0	16.0	5.0
		P_{1N} [kW]	40.69	31.89	26.06	19.84	8.65
		T_{2N} [Nm]	6,840	8,040	8,760	9,891	12,727
		P_{1NT} [kW]	20.35	19.93	16.29	14.17	0.00
		Efficiency	0.88	0.88	0.88	0.87	0.77
40:1	40:1	n_2 [rpm]	37.0	25.0	18.0	12.0	3.8
		P_{1N} [kW]	33.90	25.52	20.87	16.08	7.29
		T_{2N} [Nm]	7,410	9,480	9,250	10,445	13,720
		P_{1NT} [kW]	24.21	23.20	18.98	17.87	0.00
		Efficiency	0.87	0.87	0.87	0.85	0.74
53:1	52:1	n_2 [rpm]	28.0	18.0	14.0	9.4	2.8
		P_{1N} [kW]	27.44	20.64	16.88	13.01	5.81
		T_{2N} [Nm]	7,870	8,881	9,685	10,935	13,720
		P_{1NT} [kW]	18.29	15.88	16.88	13.01	0.00
		Efficiency	0.85	0.85	0.85	0.83	0.70
62:1	61:1	n_2 [rpm]	24.0	16.0	12.0	8.1	2.4
		P_{1N} [kW]	21.87	17.23	14.09	10.88	5.14
		T_{2N} [Nm]	6,819	8,060	8,787	9,918	12,581
		P_{1NT} [kW]	14.58	13.25	14.09	10.88	0.00
		Efficiency	0.79	0.79	0.79	0.77	0.62
83:1	83:1	n_2 [rpm]	18.0	12.0	9.0	6.0	1.8
		P_{1N} [kW]	18.60	14.18	11.25	7.80	2.94
		T_{2N} [Nm]	7,765	8,770	9,155	9,155	9,155
		P_{1NT} [kW]	14.31	14.18	11.25	9.75	0.00
		Efficiency	0.79	0.78	0.77	0.74	0.59

	7.5:1	10:1	13:1	15:1	20:1	26:1	30:1	40:1	53:1	62:1	83:1
T_{2max} [Nm]	13720	13720	10460	13720	13720	13720	13720	13720	13720	13720	13720

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

n_2 [rpm]	200		125		75		50		30		10	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
	u.r.	u.r.	u.r.	u.r.	u.r.	u.r.	u.r.	u.r.	u.r.	u.r.	u.r.	u.r.

u.r. – upon request



Inertia moments/mass

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

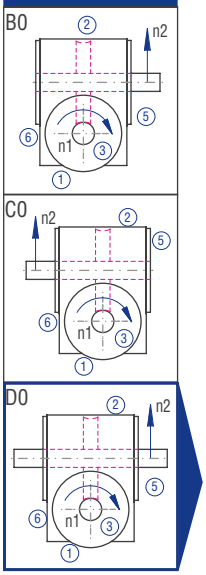
	Inertia moment [kgcm²]										
	7.5:1	10:1	13:1	15:1	20:1	26:1	30:1	40:1	53:1	62:1	83:1
J1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

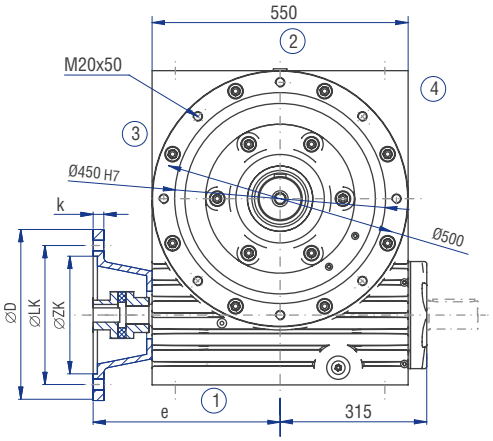
Mass ca. [kg]
520

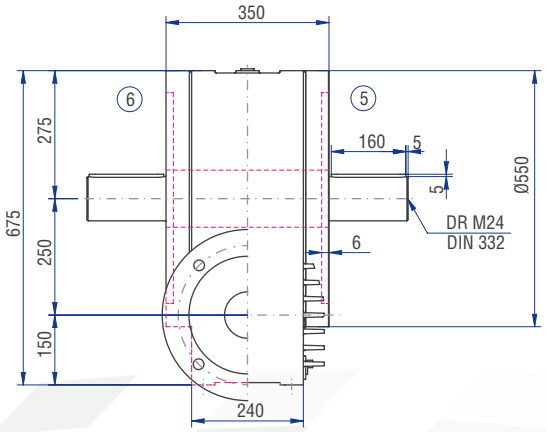
The mass of the gearbox may deviate depending on the flange size, the type and the gear ratio.

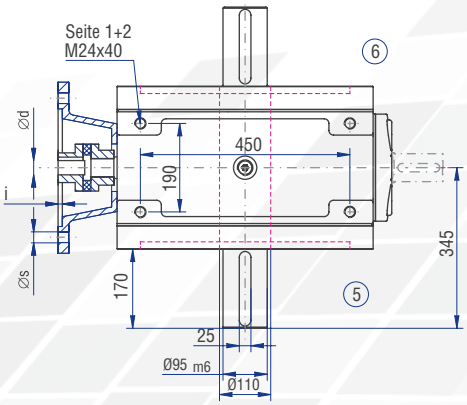
9.4.14 Type SL 250 – Type S with flange for motor mounting

Model

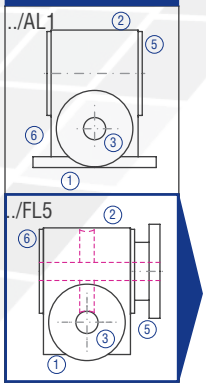


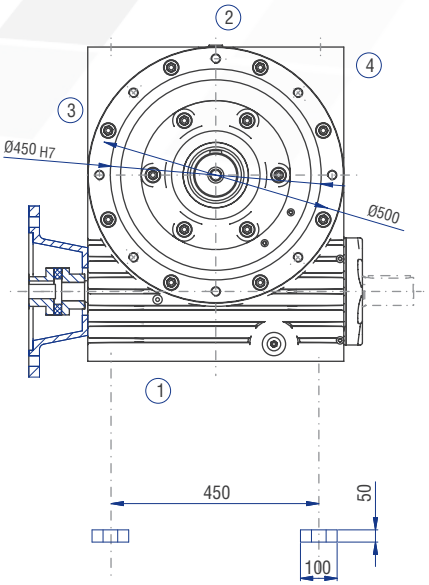


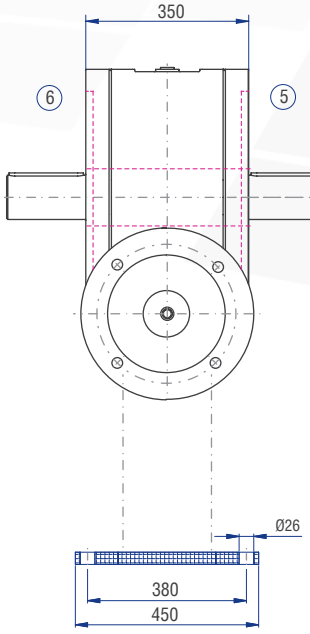




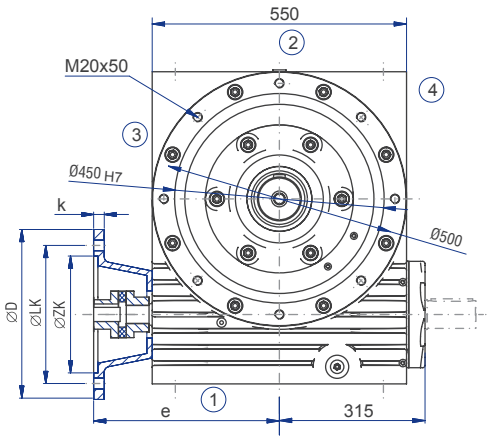
Option

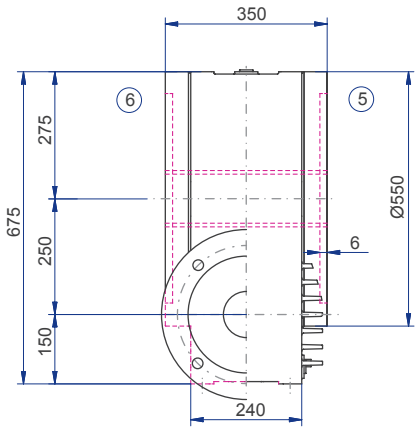




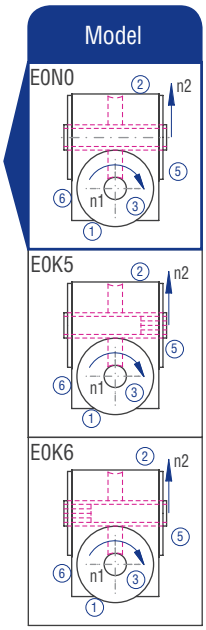


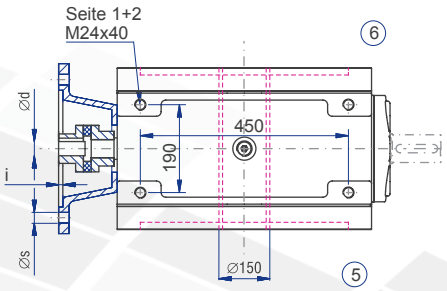
The dimensions of the Models not shown can be figured by mirroring available dimensions.

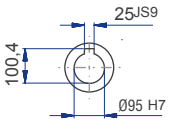




E0N0







IEC motor	Model	Motor shaft (dxl)	Flange diameter D [mm]	LK [mm]	ZK [mm]	s [mm]	i [mm]	k [mm]	e [mm]
160	B5	42x110	350	300	250	18	6	18	520
180	B5	48x110	350	300	250	18	6	18	520
200	B5	55x110	400	350	300	18	6	18	520
225	B5	60x140	450	400	350	18	6	18	545

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