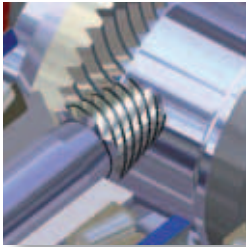
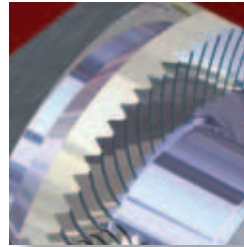


**BEVEL GEAR UNITS
ZZ-SERVOLINE®**



Gear Ratios

- $i = 3:1$
- $i = 4:1$
- $i = 5:1$
- $i = 6:1$
- $i = 8:1$
- $i = 10:1$
- $i = 12:1$
- $i = 15:1$



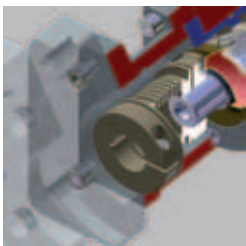
Spiral Bevel Gear

- KLINGELNBERG tooth system
- Hypoid Cyclo-Palloid
- High running quality
- Torsional backlash depending on design up to < 2 arcmin



Modularity

- Exchangeable flange plates
- High flexibility
- For all common servo motors
- Available for over 120 standard motor flange plates



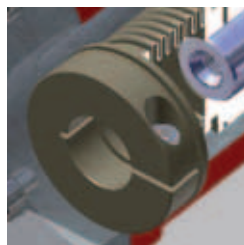
Servomotor Connection

- Exchangeable flange plates, flange dome and coupling
- Possible to fit to almost all of the available servo motors on the market



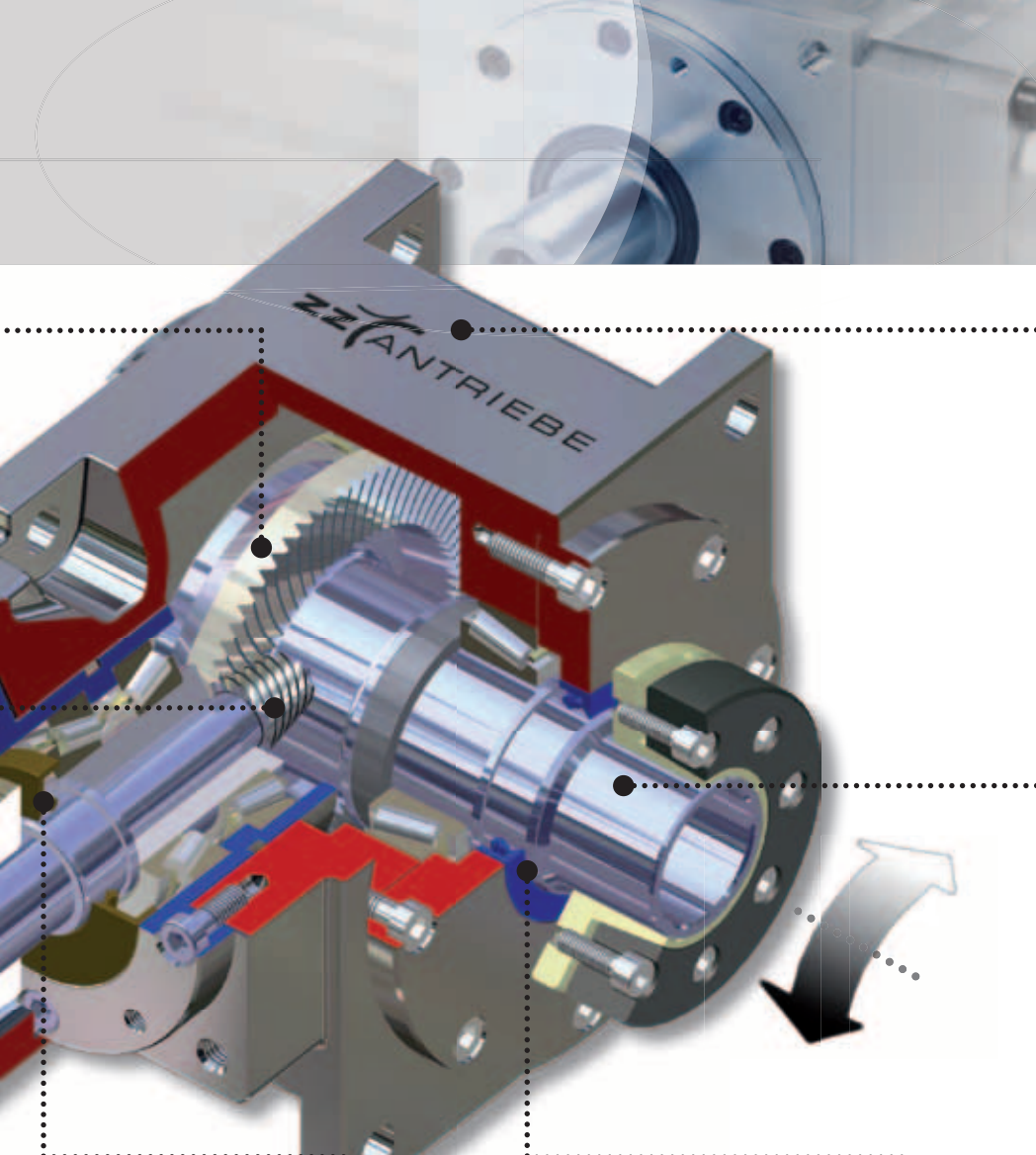
Speed Range

- High nominal input speed
- Maximum input speed up to 8000 rpm



Coupling

- Torsionally rigid
- High concentricity
- Low inertia
- Matched for all currently available servo motors



Characteristic Values

- 6 Sizes of model
- 8 Gear ratios
- 6 Different drive shafts
- More than 280 standard types

Sizes and Output Torques

- KN0035 35 Nm
- KN0070 70 Nm
- KN0140 140 Nm
- KN0260 260 Nm
- KN0700 700 Nm
- KN1400 1400 Nm

Types of output Shafts

- Solid shaft, single and double sided
- Hollow shaft, single, extended, for shrink disks
- Block flange, robot flange (DIN EN ISO 9409-1)

Material

- Housing and flange of aluminium
- Shafts of tempered steel

Lubrication

- Lifetime lubrication
- Factory filled with special hypoid oil

Mounting Position

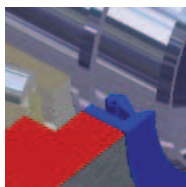
- Suitable for any optional mounting orientation

Shaft Seal






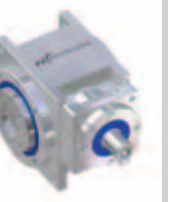





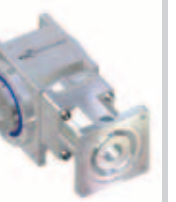
- Material Viton, FPM

Shaft Seal

- With protection lip



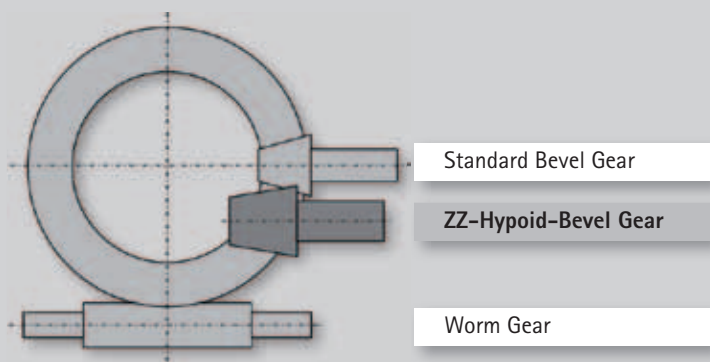
Available Options

	K1	K2	K3	K4	K5	K6
Without motor flange						
	M1	M2	M3	M4	M5	M6
With motor flange						

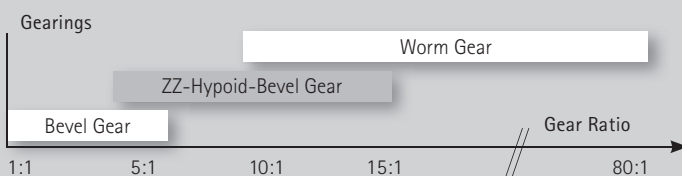
Observe the shaft rotational direction for all mounting positions of the upper mounted drive shaft according to the cross sectional drawing

The bevel gearbox range ZZ-Servoline® has been designed as a compact drive unit especially for highly dynamic uses in the automatic control engineering.

The range offers six gearbox sizes each with eight transmission ratios and six different drive shafts which allow more than 280 standard basic configurations. The single gearbox with mathematically exact transmission ratios with a range of $i = 3:1$ to $i = 15:1$ is based on a special hypoid gear with a positive offset.



The ZZ-Servoline® therefore closes and overlaps the transmission ratio gap due to the gearbox technical limitations between the bevel gear and the worm gear.



The practical requirements posed for servo motors are constructively implemented which is why the ZZ-Servoline® is used in universal applications with drive speeds up to 8000 rpm and output torques up to 1400 Nm.

For all transmission ratios within the same size, the gearbox has benefits with the same dimensions. The rotational direction of the shafts to each other is constructively set by the offset.

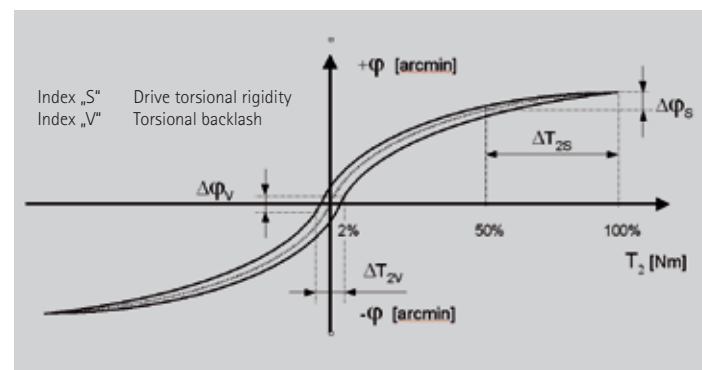
The ZZ-Servoline® can be used with or without the motor flange. At the driving end there are configurable single and dual ended solid shafts, hollow shafts and a block flange shaft for the assembly of handling devices. An optimised serration, generously dimensioned bearings and special hypoid oil are the basics for high operational safety.

For the values in the load table a smooth and even servo operation was used. Thereby the transferable performance is limited by the maximum allowable temperature of the housing and the oil bath. If, in continuous operation of the ZZ-Servoline® the rated torque is constant or less, then the serration is permanently fixed. In most applications the gearbox is closed (without pressure compensation) when being used, but with high rotational speeds and temperatures the implementation of a vent can be useful.

With frequently changing loads the input torque is applied to the gearbox through a frictional clamping element (without keyway). The output torque is transmitted to the machine through a shrink disc (without keyway).

The modular motor flange concept offers the flexibility of optimal customer usage. This way standard adapter plates suitable for the motor flange sizes can be selected and simply screwed into the gearbox side dome without any intervention in the gearbox. The modular system offers over 120 different motor adapters which makes possible the assembly to the ZZ-Servoline® with almost all available servo motors on the market.

From the ZZ-Servoline® hysteresis curve the performance characteristic of torsional backlash and the gearbox rigidity are sized.



The torsional backlash is determined with a low basic load while the gearbox rigidity is located with an almost linear deformation pattern in the upper load range.

The ZZ-Servoline® takes into account all requirements posed on modern gearbox concepts. It offers minimum torsional backlash, high rigidity, low overall weight, reduced inertia, high efficiency and with a universal assembly length, an almost maintenance free operation.

KN0035 TO KN1400 PERFORMANCE SUMMARY

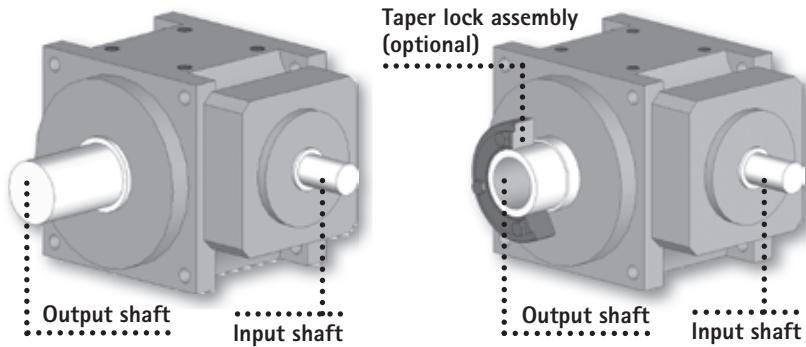


Feature / Size	Formula Symbols	Units	Ratio i	Gear Size						
				KN0035	KN0070	KN0140	KN0260	KN0700	KN1400	
Nominal output torque ¹⁾	T _{2N}	Nm	3:1	35	70	140	260	700	1400	
			4:1	34	68	135	255	680	1340	
			5:1	33	65	130	250	660	1280	
			6:1	32	60	125	240	640	1220	
			8:1	30	56	115	220	590	1120	
			10:1	28	53	105	200	540	1010	
			12:1	25	50	95	180	480	900	
Maximum acceleration torque ²⁾	T _{2B}	Nm	3:1	52	104	205	385	1040	2050	
			4:1	50	100	200	380	1010	1980	
			5:1	49	97	194	374	980	1910	
			6:1	47	89	187	356	950	1820	
			8:1	44	83	172	325	880	1670	
			10:1	40	79	157	290	800	1490	
			12:1	37	74	142	265	710	1320	
Emergency off torque ³⁾	T _{2Not}	Nm	3/4/5/6	70	140	280	520	1400	2800	
			8/10	60	110	230	440	1280	2240	
			12/15	50	100	190	360	960	1900	
Maximum drive speed	n _{1Max}	rpm ⁻¹	-	8000	7500	7000	6000	5000	4000	
Nominal drive speed ⁴⁾	n _{1N}	rpm ⁻¹	3/4/5	2200	1900	1500	1200	700	600	
			6/8/10	3000	2600	2100	1700	1000	900	
			12/15	3700	3100	2600	2100	1400	1200	
Torsional backlash ⁵⁾	Standard S reduced R Precision H	j _t	arcmin	-	≤ 7	≤ 6	≤ 6	≤ 5	≤ 4	≤ 4
				-	≤ 5	≤ 4	≤ 4	≤ 3	≤ 3	≤ 3
				-	-	-	≤ 3	≤ 2	≤ 2	≤ 2
Efficiency ⁶⁾	η	%	3/4/5/6/8	> 96	> 96	> 96	> 96	> 96	> 96	
			10/12/15	> 93	> 93	> 93	> 93	> 93	> 93	
Mass moment of inertia referred to the input shaft (without coupling)	J ₁	kgcm ²	3:1	0,584	1,320	3,41	8,49	29,7	91,3	
			4:1	0,439	0,993	2,46	6,03	20,0	61,2	
			5:1	0,357	0,834	1,98	4,79	14,7	45,1	
			6:1	0,258	0,747	1,24	4,04	11,7	34,9	
			8:1	0,214	0,654	0,958	3,36	9,08	25,8	
			10:1	0,192	0,612	0,842	3,04	7,85	21,8	
			12:1	0,181	0,592	0,780	2,87	7,14	19,6	
15:1	0,170	0,568	0,715	2,72	6,55	19,5				
Drive torsional rigidity ⁷⁾	C ₁₂₁	Nm/arcmin	-	1,9	3,4	9,0	19	56	115	
Running noise ⁸⁾	(n ₁ = 2500 min ⁻¹)	L _{pA}	dB(A)	3/4/5/6/8	≤ 68	≤ 69	≤ 70	≤ 71	≤ 72	≤ 72
				10/12/15	≤ 67	≤ 67	≤ 68	≤ 69	≤ 70	≤ 71
Weight approx. ⁹⁾	without flange with flange	m	kg	-	3	5	8	13	26	42
				-	4	6	10	18	32	58
Lifetime lubrication	-	-	-	Synthetic hypoid oil, CLP conform to DIN 51517-3						
Surface protection	-	-	-	Aluminium housing (not primed), shafts with corrosion protection						
Mounting position	-	-	-	optional						
Permissible gear temperature	U	°C	-	-10°C to +90°C						
Protection class ¹⁰⁾	-	-	-	IP64						
Service life ¹⁾	Lh	hrs	-	> 30.000						
ATEX conformity	-	-	-	Ex II 2 G/D c,k T4/120°C (on request)						

1) cycle operation S5 | 2) max 1000 cycles per hour | 3) max 1000 x during service life of gear | 4) for S1 operation mode | 5) torsional backlash "R" and "H" on request | 6) with full load | 7) average, transmission ratio dependent | 8) average sound level | 9) average (transmission ratio, design) | 10) enclosed casing, without vent |

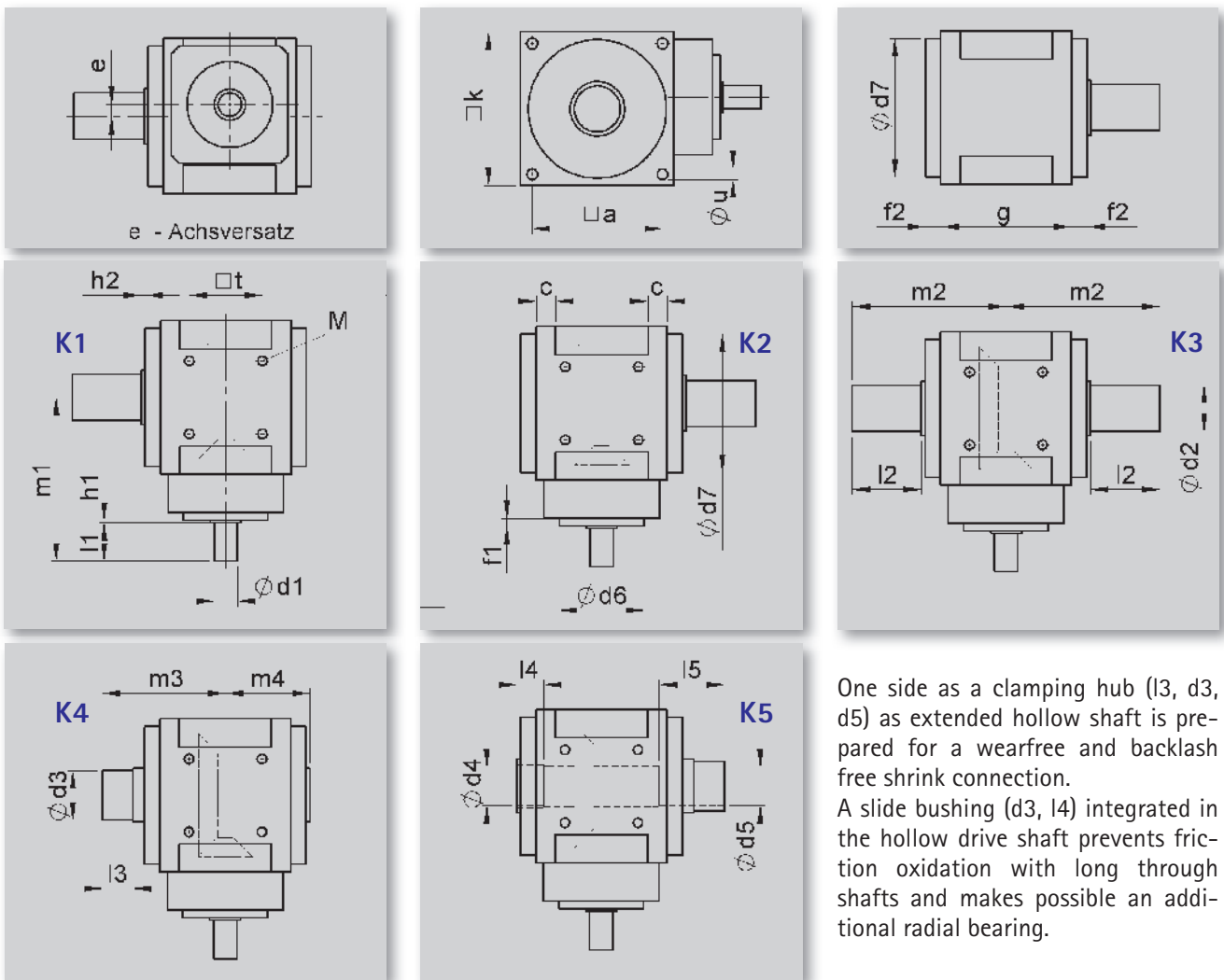
The relevant rotational speeds for the design of the gear box are the nominal speed for continuous operation and the maximum drive speed that can be allowed sporadically in the cycle operation. With high ambient temperatures and high cycles all limits are to be reduced.

The gear boxes have manufacturing tolerances with the meshing engagement which can lead to slight variations in the running noise, torsional backlash and the synchronization. This can cause transmission ratio and angular deviations when used with positioning applications.



When the input shaft and the main dimensions are the same the basic gearbox of the **ZZ-Servoline®** is available in the variants K1 - K5 with a single sided solid shaft or a solid shaft on both sides, alternatively with a hollow shaft on the output side. All shaft ends are smooth, without keyways, and are prepared for the use of shrink disc clamping elements.

Output Styles: K1 bis K5

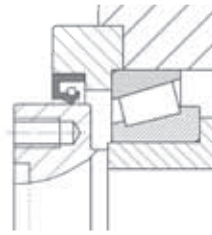
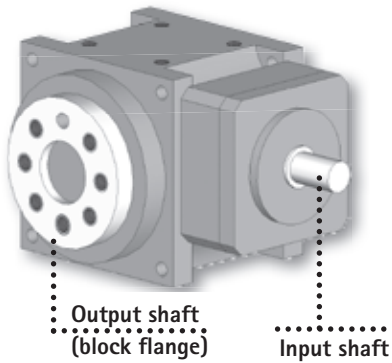


One side as a clamping hub (l3, d3, d5) as extended hollow shaft is prepared for a wearfree and backlash free shrink connection. A slide bushing (d3, l4) integrated in the hollow drive shaft prevents friction oxidation with long through shafts and makes possible an additional radial bearing.

In all illustrations the drive shaft with the offset is always at the top

Gear size	Housing Dimensions																											
	k	g	a	c	e	d _{1,6}	l1	m1	h1	d _{2,6}	l2	m2	h2	d _{3,7}	l3	m3	d _{4,8}	l4	m4	d _{5,9}	l5	d _{6,9}	f1	d _{7,9}	f2	M	t	u
KN0035	90	60	78	8,5	9	14	15	101	0,5	20	35	80	1,5	24	23	71,5	20	15	45	20	24	46	4,5	89	13,5	M6x12	44	6,6
KN0070	115	80	98	10	14	18	25	123	1	24	40	90	1,5	30	25	79,5	25	15	50	25	26	73	11	105	8,5	M8x16	54	9
KN0140	140	100	118	11	18	22	30	139	1	32	50	110	2	36	27	93	30	20	60	30	28	85	12	125	8	M10x20	66	11
KN0260	170	120	144	13	23	28	35	160	1	40	60	130	2	50	32	107	40	30	70	40	33,5	95	12	150	8	M12x24	80	14
KN0700	215	146	182	15,5	32	32	38	197	1	55	90	175	2	68	36	127	55	40	85	55	38	119	12,5	195	10	M16x30	104	17,5
KN1400	260	196	224	17	42	40	45	236	1	70	110	220	2	80	40	159	70	40	110	70	42	137	13	245	10	M16x35	140	17,5

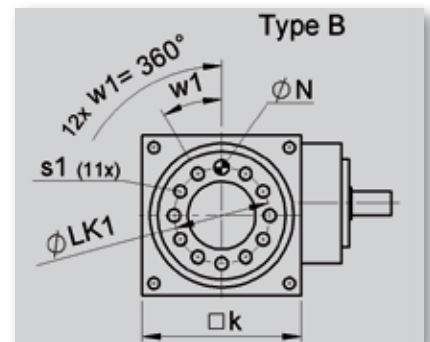
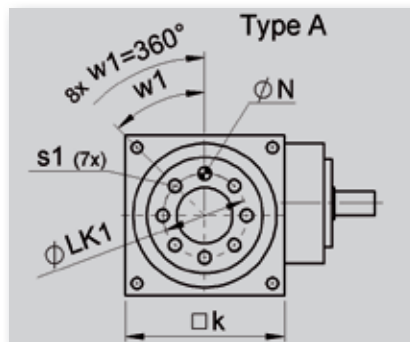
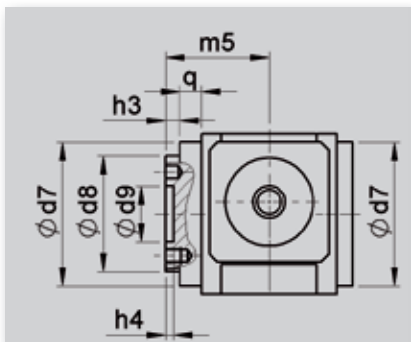
KN0035 TO KN1400 DIMENSIONS K6 (BLOCK- AND ROBOT FLANGE) MOTOR MOUNTING OPTION



The mechanical interface of the drive shaft flange corresponds to DIN EN ISO 9409-1 and is designed for the construction of handling devices and exchangeable end effectors with rounded flange.

A single piece flange shaft allows a high torsional rigidity of the drive. Non specified dimensions are according to the dimension sheet "Base Gearboxes".

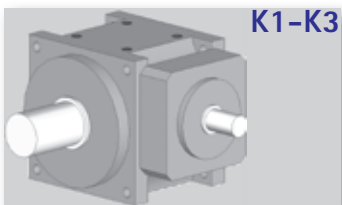
Output Style: K6



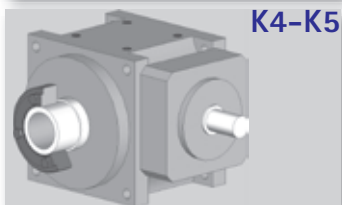
Gear size	Housing Dimensions													
	Variety	Type	k	d7 _{g6}	q	d8 _{h8}	h3	d9 ^{H7}	h4	m5	LK ₁	N ^{H8}	s ₁	w ₁
KN0035	ISO 9409-1-40-7-M6	A	90	89	20	50	7	25	6,5	57	40	Ø6x6,5	M6x9	45° (8x)
KN0070	ISO 9409-1-50-7-M6	A	115	105	15,5	63	7	31,5	6,5	62,5	50	Ø6x6,5	M6x9	45° (8x)
KN0140	ISO 9409-1-63-7-M6	A	140	125	16	80	7	40	6,5	73	63	Ø6x6,5	M6x9	45° (8x)
KN0260	ISO 9409-1-80-11-M8	B	170	150	17	100	10	50	8,5	87	80	Ø8x8,5	M8x8,5	30° (12x)
KN0700	ISO 9409-1-100-11-M8	B	215	195	17,5	125	10	63	8,5	100,5	100	Ø8x8,5	M8x8,5	30° (12x)
KN1400	ISO 9409-1-125-11-M10	B	260	245	22,5	160	12	80	8,5	132,5	125	Ø10x10,5	M10x10,5	30° (12x)

In all illustrations the drive shaft with the offset is always at the top

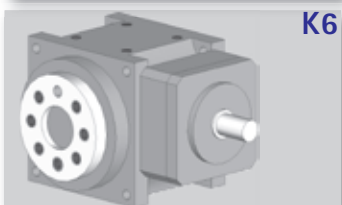
Gear Box with Motor Flange Mounting



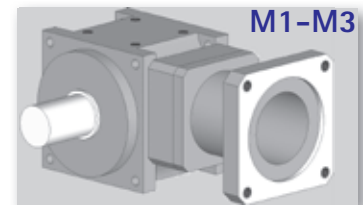
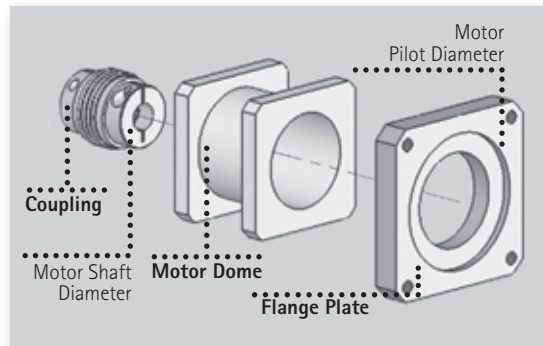
K1-K3



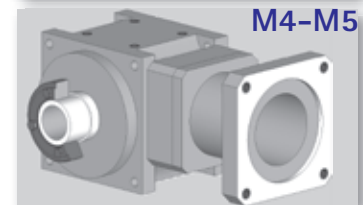
K4-K5



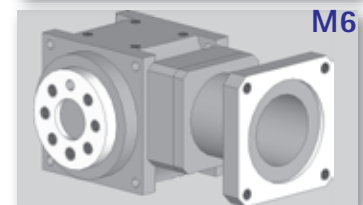
K6



M1-M3

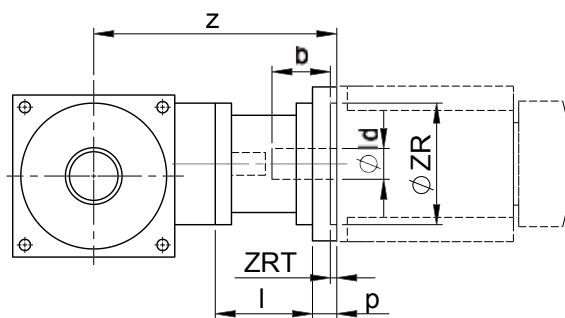
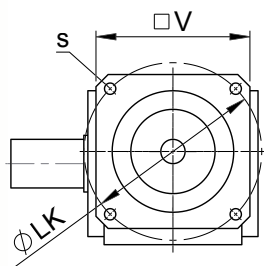
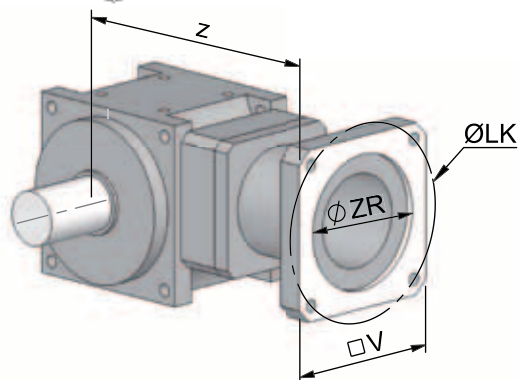
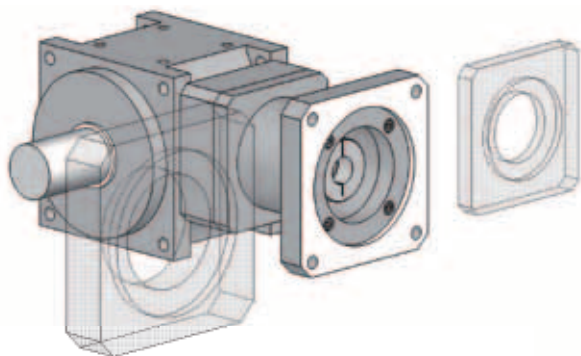


M4-M5



M6

All basic gearboxes can be extended for the direct addition of servo motors by adding a motor dome, a clutch and an exchangeable adapter plate. The designs K1 - K6 are therefore supplemented with the desired flange and clutch to the M1 - M6 complete gear designs.



Due to having a large selection of standard adapter plates, the **ZZ-Servoline®** can be easily configured for all common servo motors with rectangular flange connections. The main measurements of the flange are listed in the following table of dimensions. Length and diameter of the servo motor shaft must be within the dimensional specifications (w, d). The flange type and the clutch bore (motor shaft diameter) are also defined in the order code for the entire gearbox with motor flange. Dimensions for the gearbox not mentioned here can be taken from the table of dimensions.

ZZ-Servoline® KN0035										
ZR	LK	s	Motor Shaft		ZRT	V	l	p	z	Type code
[mm]	[mm]	[mm]	bmin ... bmax	dmin ... dmax	[mm]	[mm]	[mm]	[mm]	[mm]	
30	46	M4	18..38	3...24	4,0	65	40	19	140	A1
36	70,7	M4	18..38	3...24	4,0	65	40	19	140	A2
40	63	M4	18..38	3...24	3,5	65	40	19	140	A3
40	63	M4	20..47	3...19	4,3	80	42	26	149	W1
40	63	M5	18..38	3...24	3,5	65	40	19	140	A4
40	70	M4	18..38	3...24	3,5	65	40	19	140	A5
50	60	M4	18..38	3...24	3,5	65	40	19	140	A6
50	70	M4	18..38	3...24	3,5	65	40	19	140	A7
50	70	M4	20..47	3...19	4,3	80	42	26	149	W2
50	70	M5	18..38	3...24	3,5	65	40	19	140	A8
50	70	M5	20..47	3...19	4,3	80	42	26	149	W3
50	95	M6	18..38	3...24	4,0	80	40	19	140	A9
50	95	M6	20..47	3...19	4,3	80	42	26	149	W4
50	100	M6	18..38	3...24	3,5	110	40	19	140	B1
50	100	M6	20..47	3...19	4,3	90	42	26	149	W5
60	75	M5	18..38	3...24	3,5	80	40	19	140	B2
60	75	M5	20..47	3...19	4,3	80	42	26	149	W6
60	90	M5	18..38	3...24	4,0	80	40	19	140	B3
70	90	M5	20..47	3...19	4,3	80	42	26	149	W7
70	90	M6	20..47	3...19	4,3	80	42	26	149	W8
80	100	M6	20..47	3...19	4,3	90	42	26	149	W9
80	100	M6	27..54	3...19	4,3	90	42	33	156	X1
80	100	M6	38..65	3...19	4,3	90	42	44	167	X2
95	115	M8	20..47	3...19	4,3	110	42	26	149	X3
95	115	M8	24..51	3...19	4,3	110	42	30	153	X4
95	115	M8	38..65	3...19	4,3	110	42	44	167	X5
95	130	M8	20..47	3...19	4,3	110	42	26	149	X6
95	130	M8	31..58	3...19	4,3	110	42	37	160	X7
110	145	M8	31..58	3...19	6,5	120	42	37	160	Y2

ZZ-Servoline® KN0070										
ZR	LK	s	Motor Shaft		ZRT	V	l	p	z	Type code
[mm]	[mm]	[mm]	bmin ... bmax	dmin ... dmax	[mm]	[mm]	[mm]	[mm]	[mm]	
40	63	M4	23...53	6...28	4,3	80	65,5	26	177,5	A1
50	70	M4	23...53	6...28	4,3	80	65,5	26	177,5	A2
50	70	M5	23...53	6...28	4,3	80	65,5	26	177,5	A3
50	95	M6	23...53	6...28	4,3	80	65,5	26	177,5	A4
50	95	M6	25...60	8...30	5,0	110	70	28,5	184,5	W1
50	100	M6	23...53	6...28	4,3	90	65,5	26	177,5	A5
60	75	M5	23...53	6...28	4,3	80	65,5	26	177,5	A6
70	90	M5	23...53	6...28	4,3	80	65,5	26	177,5	A7
70	90	M6	23...53	6...28	4,3	80	65,5	26	177,5	A8
70	90	M6	25...60	8...30	5,5	110	70	28,5	184,5	W2
80	100	M6	23...53	6...28	4,3	90	65,5	26	177,5	A9
80	100	M6	25...60	8...30	5,5	110	70	28,5	184,5	W3
80	100	M6	30...60	6...28	4,3	90	65,5	33	184,5	B1
80	100	M6	35...70	8...30	5,5	110	70	38,5	194,5	W4
80	100	M6	41...71	6...28	4,3	90	65,5	44	195,5	B2
95	115	M8	23...53	6...28	4,3	110	65,5	26	177,5	B3
95	115	M8	25...60	8...30	5,5	110	70	28,5	184,5	W5
95	115	M8	27...57	6...28	4,3	110	65,5	30	181,5	B4
95	115	M8	41...71	6...28	4,3	110	65,5	44	195,5	B5
95	130	M8	23...53	6...28	4,3	110	65,5	26	177,5	B7
95	130	M8	25...60	8...30	5,5	120	70	28,5	184,5	W6
95	130	M8	34...64	6...28	4,3	110	65,5	37	188,5	B6
110	130	M8	23...53	6...28	4,3	130	65,5	26	177,5	B8
110	130	M8	25...60	8...30	5,5	130	70	28,5	184,5	W7
110	130	M8	34...64	6...28	4,3	130	65,5	37	188,5	B9
110	145	M8	25...60	8...30	6,5	130	70	28,5	184,5	W8
110	145	M8	34...64	6...28	6,5	120	65,5	37	188,5	C2
110	145	M8	34...69	8...30	6,5	130	70	37,5	193,5	W9
110	145	M8	35...70	8...30	6,5	130	70	38,5	194,5	X1
110	145	M8	40...75	8...30	6,5	130	70	43,5	199,5	X2
110	145	M8	41...71	6...28	6,5	130	65,5	44	195,5	C3
110	145	M8	47...82	8...30	6,5	130	70	51	207	X3

When selecting the motor the limits of the gearbox should be observed (e.g. torque, max. acceleration).

FLANGE DIMENSIONS KN0140 TO KN1400



ZZ-Servoline® KN0140										
ZR	LK	s	Motor Shaft		ZRT	V	l	p	z	Type code
[mm]	[mm]	[mm]	bmin ... bmax [mm]	dmin ... dmax [mm]	[mm]	[mm]	[mm]	[mm]	[mm]	
50	95	M6	28...60	8...38	5,0	110	75,5	28,5	200	A1
70	90	M6	28...60	8...38	5,5	110	75,5	28,5	200	A2
80	100	M6	28...60	8...38	5,5	110	75,5	28,5	200	A3
80	100	M6	38...70	8...38	5,5	110	75,5	38,5	210	A4
95	115	M8	27...60	8...38	5,3	150	75,5	29	200,5	W1
95	115	M8	28...60	8...38	5,5	110	75,5	28,5	200	A5
95	130	M8	27...60	8...38	5,3	150	75,5	29	200,5	W2
95	130	M8	28...60	8...38	5,5	120	75,5	28,5	200	A6
110	130	M8	27...60	8...38	5,3	150	75,5	29	200,5	W3
110	130	M8	28...60	8...38	5,5	130	75,5	28,5	200	A7
110	145	M8	27...60	8...38	6,5	150	75,5	29	200,5	W4
110	145	M8	28...60	8...38	6,5	130	75,5	28,5	200	A8
110	145	M8	33...66	8...38	6,3	150	75,5	35	206,5	W5
110	145	M8	37...69	8...38	6,5	130	75,5	37,5	209	A9
110	145	M8	38...70	8...38	6,5	130	75,5	38,5	210	B1
110	145	M8	42...75	8...38	6,5	150	75,5	44	215,5	W6
110	145	M8	43...75	8...38	6,5	130	75,5	43,5	215	B2
110	145	M8	50...82	8...38	6,5	130	75,5	51	222,5	B3
110	165	M10	27...60	8...38	5,3	150	75,5	29	200,5	W7
110	165	M10	28...60	8...38	6,5	140	75,5	28,5	200	B4
114,3	200	M12	27...60	8...38	5,3	180	75,5	29	200,5	W8
114,3	200	M12	47...80	8...38	7,5	180	75,5	49	220,5	W9
130	165	M10	27...60	8...38	5,3	150	75,5	29	200,5	X1
130	165	M10	33...66	8...38	6,3	150	75,5	35	206,5	X2
130	165	M10	38...70	8...38	6,5	140	75,5	38,5	210	B5

ZZ-Servoline® KN0260										
ZR	LK	s	Motor Shaft		ZRT	V	l	p	z	Type code
[mm]	[mm]	[mm]	bmin ... bmax [mm]	dmin ... dmax [mm]	[mm]	[mm]	[mm]	[mm]	[mm]	
95	115	M8	28...65	10...42	5,3	150	85	29	226	A1
95	130	M8	28...65	10...42	5,3	150	85	29	226	A2
110	130	M8	28...65	10...42	5,3	150	85	29	226	A3
110	145	M8	28...65	10...42	6,5	150	85	29	226	A4
110	145	M8	34...71	10...42	6,3	150	85	35	232	A5
110	145	M8	43...80	10...42	6,5	150	85	44	241	A6
110	165	M10	28...65	10...42	5,3	150	85	29	226	A7
114,3	200	M12	28...65	10...42	5,3	180	85	29	226	A8
114,3	200	M12	33...79	12...42	8,0	200	96	32,5	240,5	W1
114,3	200	M12	48...85	10...42	7,5	180	85	49	246	A9
114,3	200	M12	64...110	12...42	8,0	200	96	63,5	271,5	W2
130	165	M10	28...65	10...42	5,3	150	85	29	226	B1
130	165	M10	33...79	12...42	8,0	200	96	32,5	240,5	W3
130	165	M10	34...71	10...42	6,3	150	85	35	232	B2
130	215	M12	28...65	10...42	5,3	200	85	29	226	B3
130	215	M12	33...79	12...42	8,0	200	96	32,5	240,5	W4
180	215	M12	28...65	10...42	5,3	200	85	29	226	B4
180	215	M12	33...79	12...42	8,0	200	96	32,5	240,5	W5
180	215	M12	48...85	10...42	5,3	200	85	49	246	B5
180	215	M12	61...107	12...42	8,0	200	96	60,5	268,5	W6

ZZ-Servoline® KN0700										
ZR	LK	s	Motor Shaft		ZRT	V	l	p	z	Type code
[mm]	[mm]	[mm]	bmin ... bmax [mm]	dmin ... dmax [mm]	[mm]	[mm]	[mm]	[mm]	[mm]	
114,3	200	M12	34...82	12...45	8	200	103	32,5	280,5	A1
114,3	200	M12	42...82	12...60	8	242	91,5	43,5	280	W1
114,3	200	M12	65...113	12...45	8	200	103	63,5	311,5	A2
130	165	M10	34...82	12...45	8	200	103	32,5	280,5	A3
130	215	M12	34...82	12...45	8	200	103	32,5	280,5	A4
180	215	M12	34...82	12...45	8	200	103	32,5	280,5	A5
180	215	M12	62...110	12...45	8	200	103	60,5	308,5	A6
200	235	M12	34...82	12...45	8	220	103	32,5	280,5	A7
200	235	M12	48...88	12...60	8	242	91,5	49,5	286	W2
200	235	M12	68...116	12...45	8	220	103	66,5	314,5	A8
230	265	M12	34...82	12...45	8	240	103	32,5	280,5	A9
230	265	M12	65...113	12...45	8	240	103	63,5	311,5	B1
230	265	M12	72...112	12...60	8	242	91,5	73,5	310	W3

ZZ-Servoline® KN1400										
ZR	LK	s	Motor Shaft		ZRT	V	l	p	z	Type code
[mm]	[mm]	[mm]	bmin ... bmax [mm]	dmin ... dmax [mm]	[mm]	[mm]	[mm]	[mm]	[mm]	
114,3	200	M12	34...76	14...45	8	200	104	32,5	313,5	A1
114,3	200	M12	40...110	24...75	8	242	127	43,5	347,5	W1
114,3	200	M12	65...107	14...45	8	200	104	63,5	344,5	A2
130	165	M10	34...76	14...45	8	200	104	32,5	313,5	A3
130	215	M12	34...76	14...45	8	200	104	32,5	313,5	A4
180	215	M12	34...76	14...45	8	200	104	32,5	313,5	A5
180	215	M12	62...104	14...45	8	200	104	60,5	341,5	A6
200	235	M12	34...76	14...45	8	220	104	32,5	313,5	A7
200	235	M12	46...116	24...75	8	242	127	49,5	353,5	W2
200	235	M12	68...110	14...45	8	220	104	66,5	347,5	A8
230	265	M12	65...107	14...45	8	240	104	63,5	344,5	A9
230	265	M12	70...140	24...75	8	242	127	73,5	377,5	W3
242	300	M16	46...116	24...75	8	260	127	49,5	353,5	W4
250	300	M16	40...110	24...75	8	260	127	43,5	347,5	W5
250	300	M16	62...104	14...45	8	260	104	60,5	341,5	B1

Note: The Choice of flange is usually made by way of the dimensions of the motor. Here, the flange plate, motor dome and coupling are matched. The permissible diameter of the motor shaft must lie between d_{min} and d_{max} , the length between b_{min} and b_{max} . The on-going overview will be found under: www.zz-antriebe.eu

The equivalent bearing load is a combination of the gear reactive forces and the outer axial and radial forces on the shaft end. A complete calculation of the bearing service life and the allowable loads is only possible when the application parameters as well as the angle of inclination, the direction of acting forces and the tilting moments are known.

Size	Allowable forces and tilting moments								
	k	l2	m5	y1	y2	z2	Fr _{max} [N]	Fa _{max} [N]	Mk _{max} [Nm]
KN0035	90	35	57	36	25	63	2000	800	80
KN0070	115	40	62,5	38	28	70	3100	1200	140
KN0140	140	50	73	48	34	85	3800	1500	220
KN0260	170	60	87	55	38	100	6200	2500	440
KN0700	215	90	100,5	61	46	130	8000	3200	630
KN1400	260	110	132,5	78	55	165	13000	5200	1300

The allowable forces and tilting moments are valid for shaft measurements according to the catalogue.

Design Basis:

Collective load S5-40%, n₂ = 400 min⁻¹

Fr_{max} max. allowable radial force to the centre journal (z2) or the block flange (m5) at the most unfavourable angle of inclination (α)

Fa_{max} max. allowable axial force to the centre journal (z2) or the block flange (m5) at the most unfavourable angle of inclination (α)

Mt_{max} max. allowable tilting moment to the drive shaft or the block flange shaft

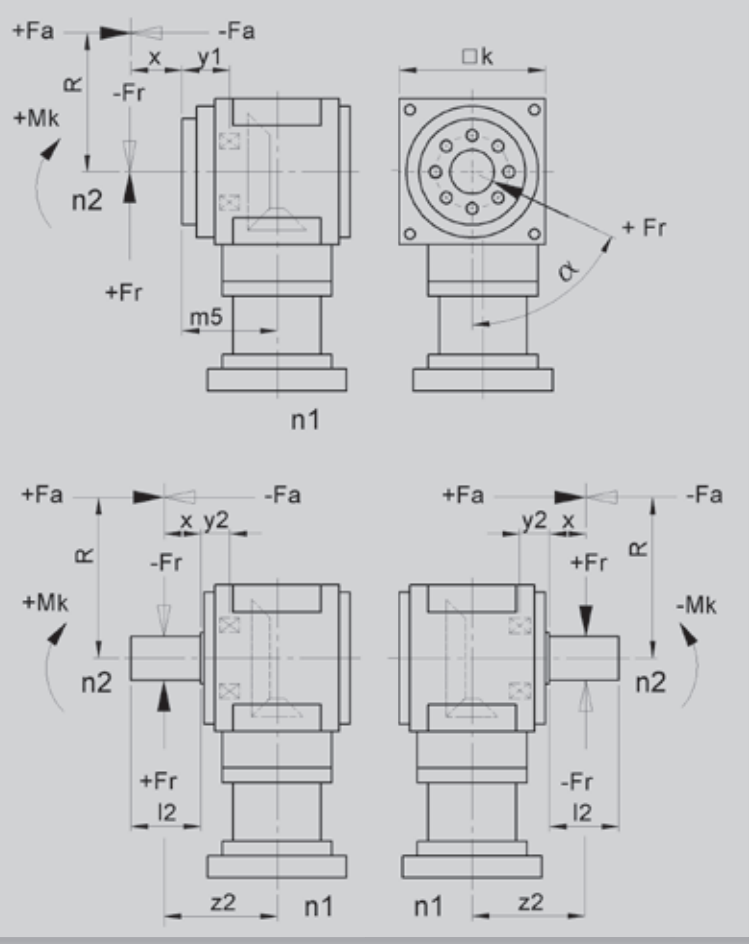
By external force exerted on the centre shaft the following is valid:

- $Mt_{1,2} = [Fa * R + Fr * (x+y_{1,2})] / 1000 \leq Mt_{max}$

For speeds higher than n₂ = 400 min⁻¹ the following applies:

- $Fr_{n2} = Fr_{(n2=400)} / (n2 / 400)^{1/3} \leq Fr_{max}$
- $Fa_{n2} = Fa_{(n2=400)} / (n2 / 400)^{1/3} \leq Fa_{max}$

High axial and radial forces occurring at the same time as high torque loadings is not allowed. With superimposed loads a factory recalculation of the gears is recommended.



Operating Modes

At typical usages of ZZ-Servoline® gearboxes a difference should be made between the operating modes, continuous operation (S1) and the cycle operation (S5). In which case the movement profile is either marked by frequent acceleration periods and periods of delay with pauses or there is an application with long periods of continuous operation.

The continuous operation is defined by the duty cycle. This is present when the switch-on duration is more than 60% of the cycle time or longer than 20 minutes. With the temperature critical application the nominal speed of the gearbox should not be exceeded without additional cooling because the transfer performance is limited by the thermal capacity. Temperature monitoring is recommended with this application.

The cycle operation is also determined by the switch-on duration. Whereby the switch-on duration is less than 60% of the process operation and less than 20 minutes. Whereby the maximum rotational speed should at no point in time be exceeded. A high number of cycles in connection with short acceleration times can lead to oscillations and torque overloads. With cycles of more than 1000/hrs. the allowable output acceleration torque is to be reduced (consultation with ZZ requested).

For the values in the performance table a smooth and even servo operation was used. Conversion for other modes of operation is to a limited extent possible when the application data is known. Principally for all operation modes the limits for rotational speed, torque, acceleration and temperature should be observed.

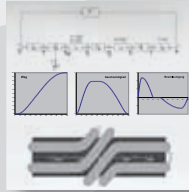


The core of our competence, from the idea to the finished gear



Engineering and Design

of all common types of toothed components and gears



Calculation and Design

of movement processes, kinematic chains, subassemblies and drives



Service

and extensive consultation with support in all engineering processes



ZZ-Bevel Gear Units

up to 7000 Nm nominal torque or 500 kW power. ZZ Servoline® series for high-dynamic drives



ZZ-Hirth-Couplings

Self centering, two and three pieces, form lock connection with a high contact ratio in standard and special form



ZZ-Cam gear boxes

as globoid, disc cams or cylinder cam gearboxes with application optimised special movement functions



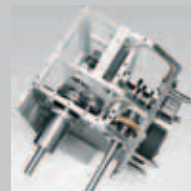
ZZ-Spiral Bevel Gear Wheels

- palloid toothed
- cyclo-palloid toothed
- HPG-S toothed



ZZ-Cams

- as - globoid cams
- axial cams
- radial cams



ZZ-Special gear boxes

as special gear boxes for use in the printing and packaging industry as well as for general industrial automation.

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