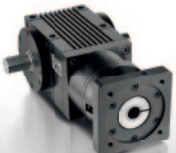
BT – spiral bevel gear boxes

Solid and Hollow Shaft Design

Cycloidal gear boxes

Planetary gear boxes

Bevel gear boxes



Planetary bevel gear boxes

Hypoid gear boxes

Gear technology

EPPINGER
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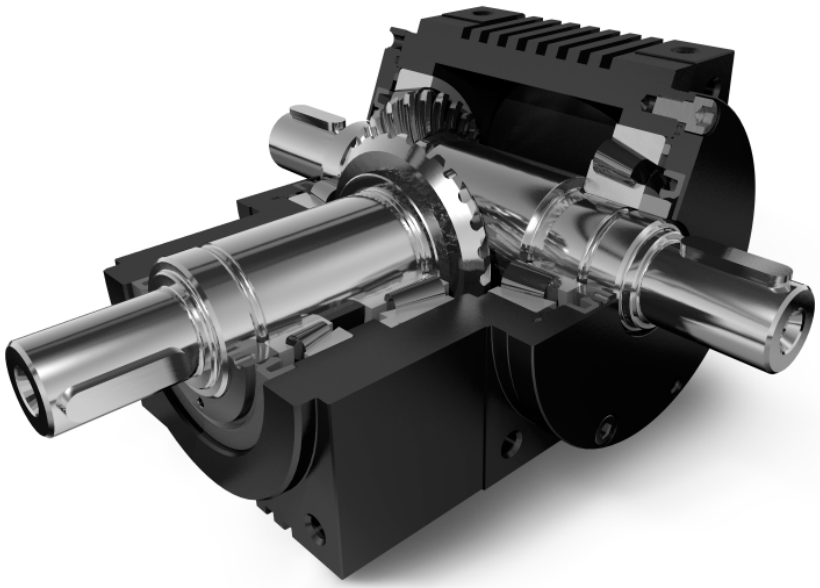
EPPINGER BT bevel gear boxes

The BT range of bevel gear boxes is destined for all gear box applications which depend on reliability and variability. Compact dimensions and high transmission torque at optimal performance are of central importance here. Precision of the axes and bearing seats, combined with Gleason bevel gears to take high loads, are the basis for minmized tooth clearance and optimal transmission properties. The gear boxes are presently available in 7 sizes, each with a ratio range of i = 1 : 1 to 5 : 1. In addition, a further range of BM bevel gear boxes is available, which offers significantly greater torque at i = 1 : 1 at comparable sizes.



FEATURES AND BENEFITS OF THE NEW BT BEVEL GEAR BOX SERIES

THE HOUSING:

- single-component steel housing with maximum precision of axes and bearing seats, all integrated directly into the housing
- high power density of the gear boxes through compact housing dimensions
- drive-sided gear box interface offers the option of direct connection of planetary gear box pre-stages, as well as secure mounting of motor flanges
- increased thermal exhaust performance of the gear boxes by increasing the housing surface area, e.g. by adding a ribbed structure on two sides of the housing
- mounting threads on all sides of the housing allow for stable attachment of the gear box in various installation positions

THE GEARS:

- heavy duty bevel gears, designed and manufactured according to the Gleason process, result in optimal gearing efficiency, high transmission precision and reduced stress on the bearings
- friction-locked, zero backlash connection of the crown gears on the drive shaft reduces the mass of the gearing component
- precise gear setting by measuring the gear box components and 100% running test of the gear boxes in assembly

SHAFTS AND BEARINGS:

- steel alloy shafts with precise bearing seats as basis for precise and heavy duty taper roller bearings
- extremely precise positioning and setting of bearings through the use of ground steel shims and splinting of the inner rings

THE RANGE OF GEAR BOXES:

- at present, 7 gear box sizes with a transmission ratio i = 1 : 1 to 5 : 1
- gear box can be supplied with solid or hollow shafts in standard and customized designs
- best efficiency when high transmission performance is required. High efficiency levels of course result in a reduction of energy costs.

Performance data

	Abbre-viation	Unit	Ratio	BT050	BT075	BT090	BT110	BT140	BT170	BT210	BT240	BT280
Nominal output torque **Max. output torque** [1]	T2N T2max	Nm Nm	i = 1 : 1	15 30	50 100	90 180	165 330	380 760	620 1240	1250 2500	In process of planning	
	T2N T2max	Nm Nm	i = 1.5 : 1	- -	50 100	90 180	165 330	380 760	620 1240	1250 2500		
	T2N T2max	Nm Nm	i = 2 : 1	- -	44 88	74 148	155 310	320 640	580 1160	1120 2240		
	T2N T2max	Nm Nm	i = 3 : 1	- -	35 70	55 110	125 250	245 490	470 940	950 1900		
	T2N T2max	Nm Nm	i = 4 : 1	- -	28 56	50 100	105 210	210 420	390 780	840 1680		
	T2N T2max	Nm Nm	i = 5 : 1	- -	25 50	40 80	90 180	175 350	340 680	700 1400		
Nominal speed	n1N n1N n1N	rpm rpm rpm	i = 1 : 1 i = 1.5 : 1 / 2 : 1 i = 3 : 1 / 5 : 1	2500 - -	2000 2500 3000	1700 2000 2500	1400 1600 2100	1100 1400 2000	1000 1300 1800	800 1050 1600		
Max. nominal speed [2]	n1max	rpm		7500	6500	5500	4500	3500	3000	2200		
Permissible radial load [3, 4]	FR1max FR2max	N N		300 400	950 1100	1400 1600	2100 2600	3600 4600	5000 6000	8200 10000		
Permissible axial load [4]	FA1max FA2max	N N		150 200	500 600	700 800	1000 1300	1800 2300	2500 3000	4000 5000		
Tooth clearance output drive shaft	jt	arcmin arcmin	standard reduced	≤16 ≤10	≤13 ≤ 8	≤12 ≤ 7	≤11 ≤ 7	≤10 ≤ 6	≤10 ≤ 6	≤ 9 ≤ 6		
Efficiency at nominal load	η	%		> 98								
Operating noise [5]	Lpa	db(A)		70	70	73	75	76	77	79		
Service life	Lh	h		> 15,000								
Oil filling [6]		ltr		0.03	0.06	0.09	0.16	0.35	0.80	2,0		
Lubrication				Synthetic oil, ISO VG 150								
Operating temperatures		C⁰		-30 to 100								
Weight [7]		kg		1.5	5.2	8.3	14.0	26.0	42.0	79,0		
As-delivered condition				Housing and flanges burnished black								
Mass moment of inertia [8]	I_1	kgcm²		Upon request								

[1] 1000x permissible short overload peaks during service life of gear boxes
[2] requires special measures
[3] related to center of shaft journal
[4] reduced values for nominal torque/nominal speed
[5] for nominal speed and partial load
[6] dependent on installation position
[7] with output shaft design S13
[8] related to the drive

Thermal limit rating

	Abbreviation	Unit	BT050	BT075	BT090	BT110	BT140	BT170	BT210	BT240	BT280
Thermal limit rating [9] [9] at T2N, i = 1:1, RT=20°C and ED = 100%	Ptherm	kW	2.0	5.0	7.5	11.0	18.0	26.5	35.0		

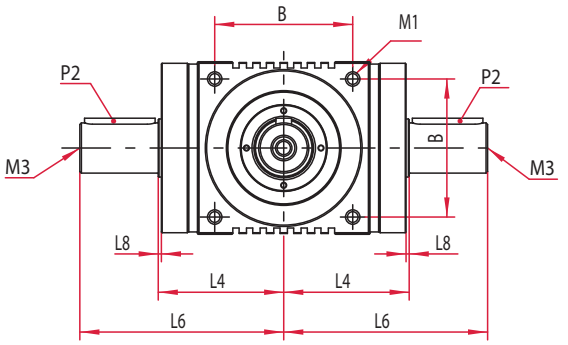
Definition: the thermal limit rating Ptherm is the transferable output during continuous operation at a max. permissible oil bath temperature of 90 °C. The permissible limit values for the thermal limit rating for intermittent operation can be determined as reference values as a function of rotational speed n1 and ambient temperature by applying the correction factors given below.. In this context the effective output must not exceed the permissible limit values.

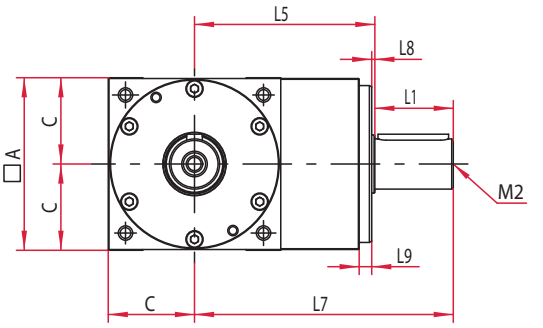
Ptherm, effective < Ptherm, permissible

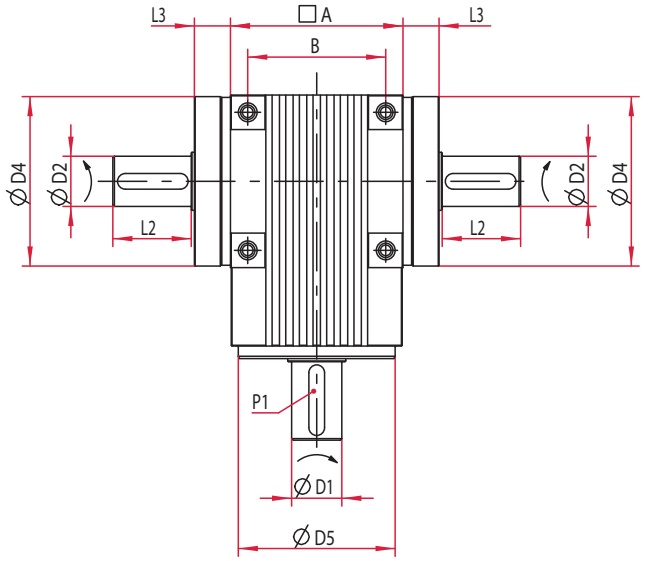
Example:	Gear	Revolution speed	ED	Ambient
Permissible thermal limit rating at:	BT110 1 : 1	560 rpm	60%	40°C
Ptherm, permissible = Ptherm (BT110) x K1 x K2 x K3 = 11.0 kW x 1.0 x 1.4 x 0,7 = 10.8 kW				

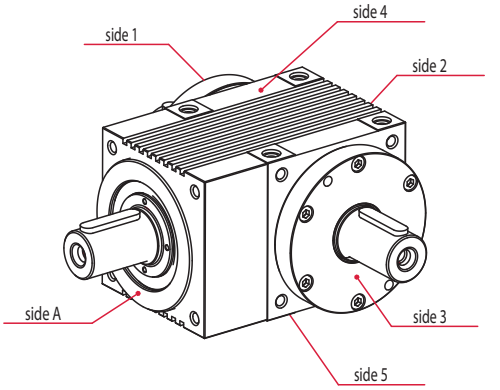
Drive speed [rpm] correction factor K1		0.4*n1N 1.0	0.7*n1N 0.8	n1N 0.5	
Switch-on time ED [%] **Correction factor K2**	100 1.0	80 1.2	60 1.4	40 1.6	20 1.8
Ambient temperature [°C] correction factor K3	10 1.20	20 1.00	30 0.83	40 0.70	50 0.60

Solid Shaft Design







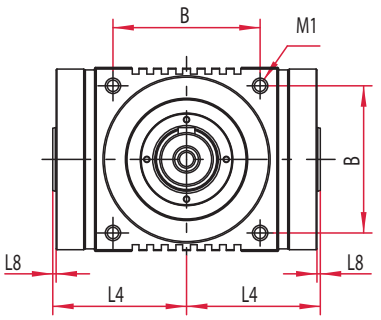


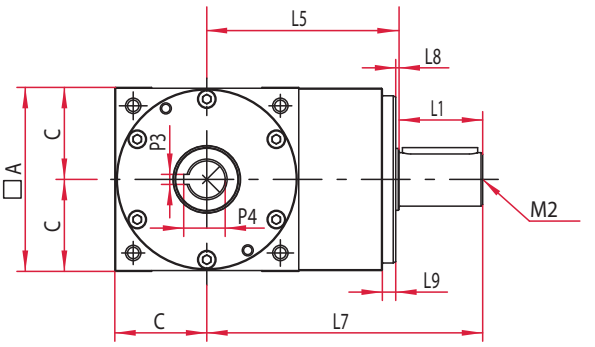
Solid Shaft Design (dimensions in mm)

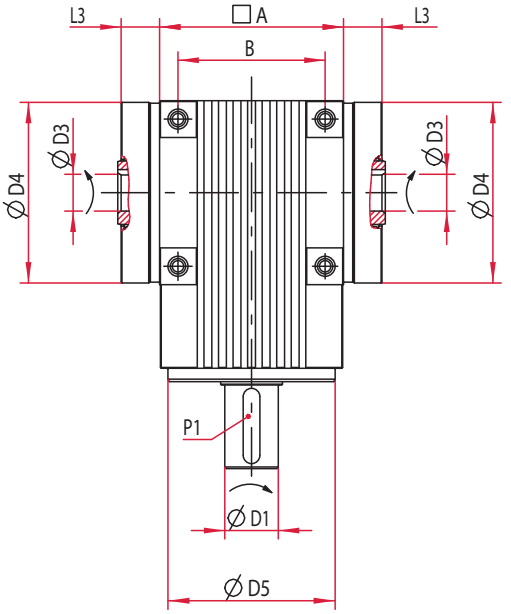
	BT050	BT075	BT090	BT110	BT140	BT170	BT210	BT240	BT280
□A	50	75	90	110	140	170	210	In process of planning	
B	38	60	72	88	110	134	170		
C	25	37,5	45	55	70	85	105		
Ø D1	12 k6	18 k6	20 k6	25 k6	32 k6	40 k6	50 k6		
Ø D2	12 k6	18 k6	20 k6	25 k6	32 k6	40 k6	50 k6		
Ø D4	49h7	73 h7	88 h7	108 h7	135 h7	165 h7	205 h7		
Ø D5	45g6	67 g6	80 g6	100 g6	120 g6	128 g6	158 g6		
L1	23	30	35	40	50	60	80		
L2	23	30	35	40	50	60	80		
L3	8,5	14,5	15	15	18	15	16		
L4	35,5	54	62	72	90	102	127		
L5	60	90	100	115	130	155	190		
L6	58,5	84	97	112	140	162	207		
L7	83	120	135	155	180	215	270		
L8	2	2	2	2	2	2	2		
L9	5	6	8	8	8	10	14		
P1	3x3x18	6x6x25	6x6x28	8x7x32	10x8x45	12x8x50	14x9x70		
P2	3x3x18	6x6x25	6x6x28	8x7x32	10x8x45	12x8x50	14x9x70		
M1	M5x9	M5x10	M6x12	M8x16	M10x20	M12x24	M16x32		
M2/M3*	M5	M6	M6	M8	M10	M16	M16		

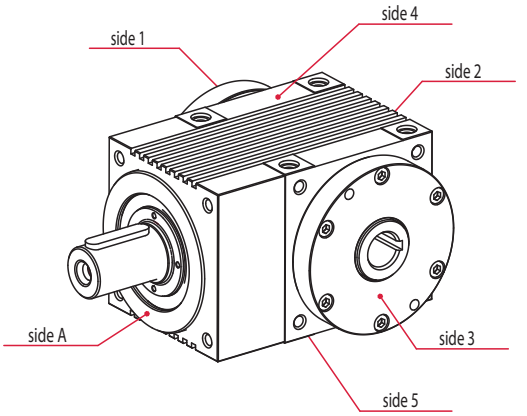
* Thread in shaft end acc. to form DS, DIN 332

Hollow Shaft Design









Hollow Shaft Design (dimensions in mm)

	BT050	BT075	BT090	BT110	BT140	BT170	BT210	BT240	BT280
□ A	50	75	90	110	140	170	210	In process of planning	
B	38	60	72	88	110	134	170		
C	25	37,5	45	55	70	85	105		
Ø D1	11 k6	18 k6	20 k6	25 k6	32 k6	40 k6	50 k6		
Ø D3	9 H7	14 H7	18 H7	22 H7	32 H7	40 H7	50 H7		
Ø D4	49 h7	73 h7	88 h7	108 h7	135 h7	165 h7	205 h7		
Ø D5	45 g6	67 g6	80 g6	100 g6	120 g6	128 g6	158 g6		
L1	23	30	35	40	50	60	80		
L3	8,5	14,5	15	15	18	15	16		
L4	35,5	54	62	72	90	102	127		
L5	60	90	100	115	130	155	190		
L7	83	120	135	155	180	215	270		
L8	2	2	2	2	2	2	2		
L9	5	6	8	8	8	10	14		
P1	3x3x18	6x6x25	6x6x28	8x7x32	10x8x45	12x8x50	14x9x70		
P3	3 JS9	5 JS9	6 JS9	6 JS9	10 JS9	12 JS9	14 JS9		
P4	11,4	16,3	20,8	24,8	35,3	43,3	45,5		
M1	M5x9	M5x10	M6x12	M8x16	M10x20	M12x24	M16x32		
M2*	M5	M6	M6	M8	M10	M16	M16		

* Thread in shaft end acc. to form DS, DIN 332

EPPINGER precision gear boxes at a glance

Our product range includes besides **bevel-, hypoid-, planetary- and cycloidal gear boxes** also **special customized gear boxes and high precision gear technology**. With our **gear motors and integrated combinations of our gear box series** we extended our portfolio. The **compact and the mono-bloc design** as well as our maximum **gear quality** makes our solutions **unique**.

Ordering code

	Type of gear box	Size	Type of shaft	Ratio
Example for ordering: BT090 S13 1.5:1	BT	050 075 090 110 140 170 210 (240) (280)	S01 - Solid shaft side 1 S03 - Solid shaft side 3 S13 - Solid shaft sides 1+3 H13 - Hollow shaft sides 1+3	i = 1 : 1 i = 1.5 : 1 i = 2 : 1 i = 3 : 1 i = 4 : 1 i = 5 : 1
Upon request: motor flange, different shaft dimensions, customized solutions, fittings,....				
Subject to change in design. We recommend technical clarification prior to ordering.				

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