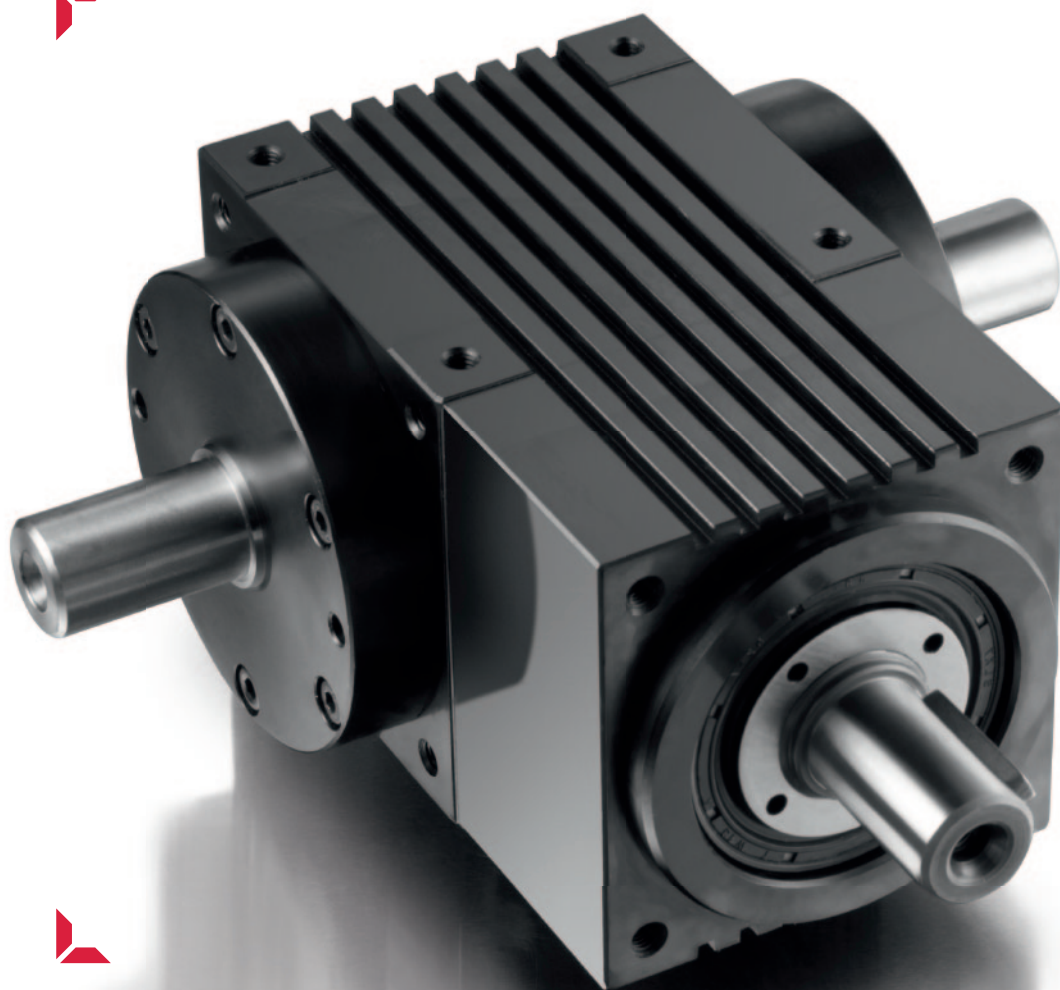


BT – spiral bevel gear boxes

Solid and Hollow Shaft Design



Cycloidal gear boxes



Planetary gear boxes



Bevel gear boxes



Planetary bevel gear boxes



Hypoid gear boxes

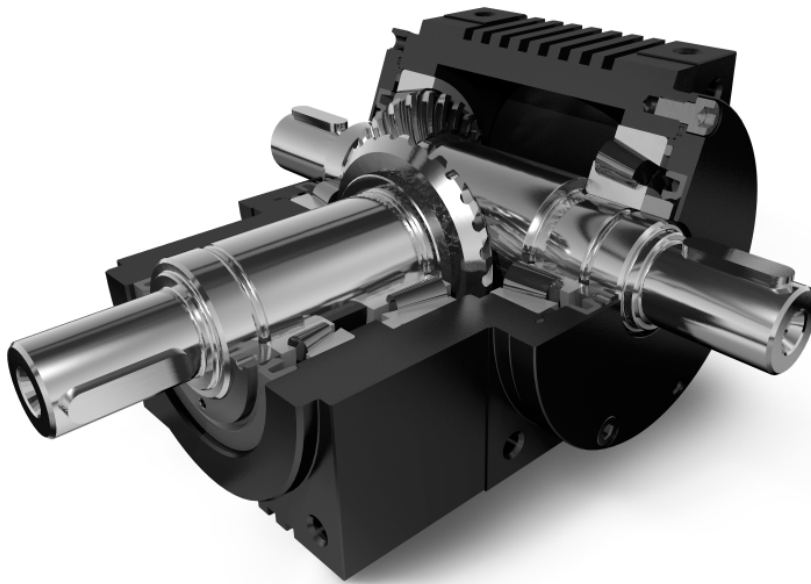


Gear technology

EPPINGER 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 minimized 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

	Abbreviation	Unit	Ratio	BT050	BT075	BT090	BT110	BT140	BT170	BT210	BT240	BT280
Nominal output torque Max. output torque ¹	T2N	Nm	i = 1 : 1	15	50	90	165	380	620	1250		
	T2max	Nm		30	100	180	330	760	1240	2500		
	T2N	Nm	i = 1.5 : 1	-	50	90	165	380	620	1250		
	T2max	Nm		-	100	180	330	760	1240	2500		
	T2N	Nm	i = 2 : 1	-	44	74	155	320	580	1120		
	T2max	Nm		-	88	148	310	640	1160	2240		
T2N	Nm	i = 3 : 1	-	35	55	125	245	470	950			
	Nm		-	70	110	250	490	940	1900			
T2N	Nm	i = 4 : 1	-	28	50	105	210	390	840			
	Nm		-	56	100	210	420	780	1680			
T2N	Nm	i = 5 : 1	-	25	40	90	175	340	700			
	Nm		-	50	80	180	350	680	1400			
Nominal speed	n1N	rpm	i = 1 : 1	2500	2000	1700	1400	1100	1000	800		
	n1N	rpm	i = 1.5 : 1 / 2 : 1	-	2500	2000	1600	1400	1300	1050		
	n1N	rpm	i = 3 : 1 / 5 : 1	-	3000	2500	2100	2000	1800	1600		
Max. nominal speed ²	n1max	rpm		7500	6500	5500	4500	3500	3000	2200		
Permissible radial load ^{3,4}	FR1max	N		300	950	1400	2100	3600	5000	8200		
	FR2max	N		400	1100	1600	2600	4600	6000	10000		
Permissible axial load ⁴	FA1max	N		150	500	700	1000	1800	2500	4000		
	FA2max	N		200	600	800	1300	2300	3000	5000		
Tooth clearance output drive shaft	jt	arcmin	standard	≤16	≤13	≤12	≤11	≤10	≤10	≤9		
		arcmin	reduced	≤10	≤8	≤7	≤7	≤6	≤6	≤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		°C		-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	kgcm ²		Upon request								

In process of planning

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

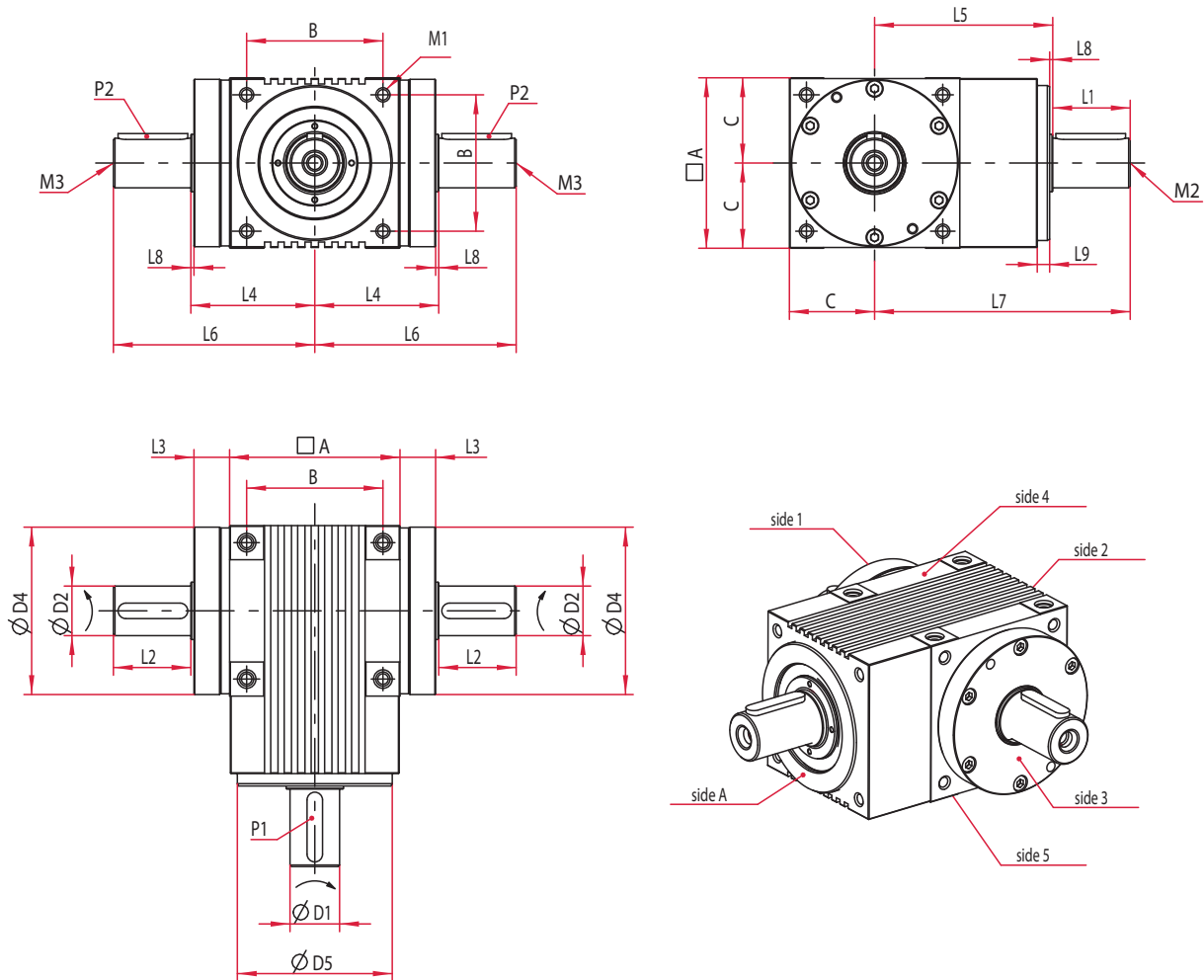
⁷ with output shaft design S13

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%	P _{therm}	kW	2.0	5.0	7.5	11.0	18.0	26.5	35.0		
Definition: the thermal limit rating P _{therm} 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. P _{therm, effective} < P _{therm, permissible}			Drive speed [rpm] correction factor K1			0.4*n1N	0.7*n1N	n1N			
						1.0	0.8	0.5			
			Switch-on time ED [%] Correction factor K2			100	80	60	40	20	
Example:	Gear	Revolution speed	ED	Ambient		1.0	1.2	1.4	1.6	1.8	
Permissible thermal limit rating at:	BT110 1 : 1	560 rpm	60%	40°C							
P _{therm, permissible} = P _{therm} (BT110) x K1 x K2 x K3 = 11.0 kW x 1.0 x 1.4 x 0,7 = 10.8 kW			Ambient temperature [°C] correction factor K3			10	20	30	40	50	
						1.20	1.00	0.83	0.70	0.60	

Solid Shaft Design

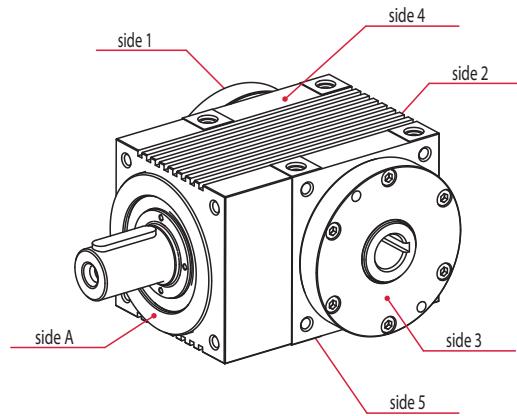
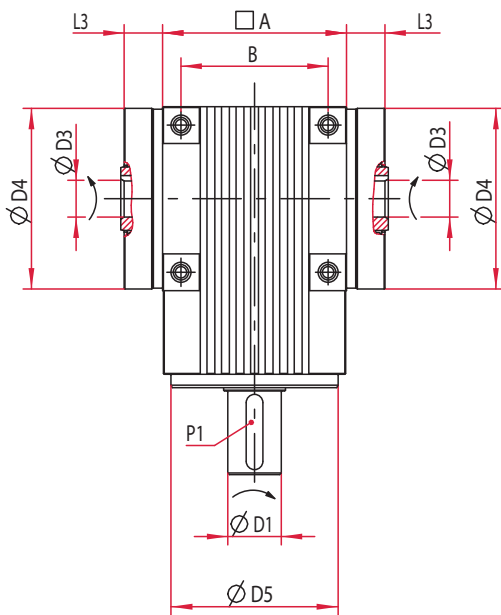
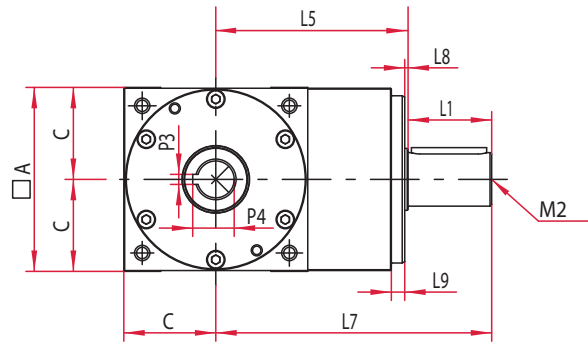
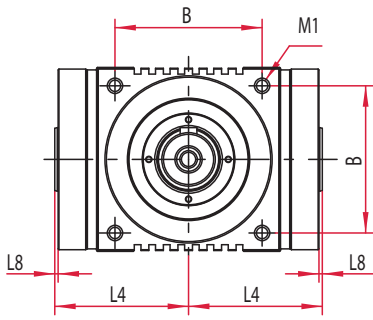


Solid Shaft Design (dimensions in mm)

	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		
B	38	60	72	88	110	134	170		
C	25	37,5	45	55	70	85	105		
∅ D1	11 k6	18 k6	20 k6	25 k6	32 k6	40 k6	50 k6		
∅ D3	9 H7	14 H7	18 H7	22 H7	32 H7	40 H7	50 H7		
∅ D4	49 h7	73 h7	88 h7	108 h7	135 h7	165 h7	205 h7		
∅ 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		

In process of planning

* 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	S01 - Solid shaft side 1	i = 1 : 1
		075	S03 - Solid shaft side 3	i = 1.5 : 1
		090	S13 - Solid shaft sides 1+3	i = 2 : 1
		110		i = 3 : 1
		140	H13 - Hollow shaft sides 1+3	i = 4 : 1
		170		i = 5 : 1
		210		
		(240)		
(280)				

Upon request: motor flange, different shaft dimensions, customized solutions, fittings,....

Subject to change in design. We recommend technical clarification prior to ordering.



EPPINGER 
PRECISION GEAR SOLUTIONS