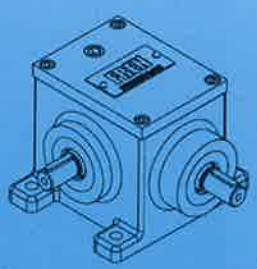
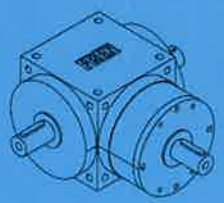
ENZFELDER GmbH

Power transmission- and lifting engineering

Bevel Gear Box
Type K and H





History

1969 Mr. Enzfelder established a job shop in Vienna. Equipped with some machinery, the Enzfelder Company manufactured machine parts according to drawings.
Within one year the number of employees rose to 3. The Enzfelder company started manufacturing threaded spindles and nuts according to drawings. Then the range of manufacturing was enlarged by toothed wheels, screw wheels and endless screws according to drawings.

1974 The company including the complete manufacture was relocated to Enzesfeld.

1975 The manufacture of spindle gears was launched. The company's experience in the manufacture of trapezoid-threaded spindles, nuts, worm gear pairs and casings was a valuable basis for the construction. After many tests, the serial production of spindle gears was launched one year later. The result was a product characterized by a first-rate price-performance ratio. The product was distributed by dealers all over Europe.

1981 The planning and construction of small hydropower plants was launched to replace diesel generators. Environmental protection was not really a topic at that time, however, and the production was stopped in 1986.

1989 The Enzfelder GesmbH company replaced the Franz Enzfelder Company.

1990 Scissor-type lifting platforms and cable winches were added to the delivery program.

1991 Resilient spacer shafts were tested and added to the production range. At the same time, the telescopic spindle gear was developed. A patent for this principle was applied for and issued.

1993 The sale of spindle gears under their own name was launched and presented for the first time at the Hannover industrial fair. We have been approached with a variety of tasks and have provided solutions according to the customers' needs ever since.

1994 In cooperation with our customers we produced the first bevel gears to specification.

1995 Spindle bearing arrangements were designed and included in the standard program.

1996 The Enzfelder company produced planet gear to specification for the first time.

1998-1999 The standard programs were enlarged. Additionally, bevel gears are manufactured in a standard design.

2000 The development of electric cylinders in standard design for very high loads (5-1000kN) was started. At the same time the telescopic spindle gears were refined to save the customer the guiding and locking devices. Since that time we have been able to offer telescopic cylinders, too.

2001 The development of electric cylinders was completed, and these cylinders were added to the standard program.
At the same time the development and fabrication of cubic spindle gears for lifting loads between 2.5 and 150kN was started. These gears were added to the standard program as well.

2002 were extended and optimized the series of the electric cylinders. Further we provide an electronic 2D-3D product catalogue of the spindle gears, it makes it possible to integrate our products into your system.

2002-2003 We putted our new assembling and packaging hall, beside the manufacturing hall, in operation

2003 We increased our machinery by buying a CNC machine tool with 7 axes, brand AXA. That new CNC machine allows a precise machining of the screw jack housings in only two clamping.

2003-2004 The engineering started to use new 3-D CAD software, Solid Edge. That software enables our customers to integrate easily our drawings.

2004 We opened a sales office in France.

2004-2005 We started to design the high performance screw jacks HSG and we created a range of 10 different sizes.

2005 First participation to an exhibition in France: INDUSTRIE 2005 at Lyon.

2005-2006 We started to design a new range of telescopic screw jacks TSGLR. Today, these new telescopic screw jacks, with a more compact design, are used in the stage industry, in the aircraft industry, on train lifting equipments and in machine building.

2008 We replaced the tread grinding machine by a new CNC thread grinding machine, brand Mikromat.

2008-2009 transmission program is certified to ATEX

2009-2010 beginning of the series production of Quick-lifting screw jacks SHG

2010 Development of the transmission range Servo lifting gear (backlash & game adjustable)
Expand our global market with traders in Australia

2011 development Servo lifting electric cylinder SHELZ (Servo lifting gear with cylindrical structure) and the beginning of the ELZP Series Electric cylinders parallel for Industry sector applications.

2012 acquisition of the product group UniCe worm gear, helical worm geared motors, couplings, torque limiters and slip clutches. Expansion screw jacks cubic BG up to size for 1000kN

2013-2014 revision of the telescopic spindle cylinder TSGZ the new cost-optimized design.
Development of product group Electric PNEU, electric cylinder with ball screw, stainless version in hygienically optimized design with mounting dimensions, speeds and forces such as pneumatic cylinder.

2014 first Quick-lifting screw jacks with cylindrical structure can be delivered SHGZ = Quick-lifting electric cylinder

In recent years, customer problems are solved in the drive and lifting technology from us. Depending on the application, we developed the optimal solution and made with the best possible price / performance ratio.

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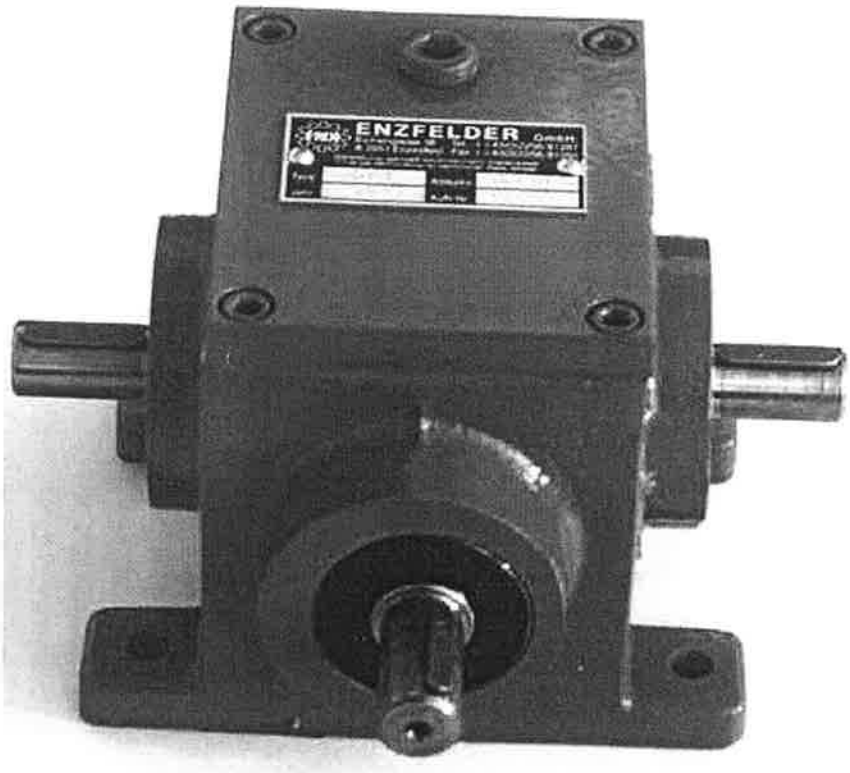

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In our lifting systems 2 types of bevel gears can be used. The types H and the types K. Both of them have been used during many years. On the great diverity of the intonation has been considert, while planing and constructioning them.
The gears are built very compact and they have a very small weight. Both series can be delivered also with flange or hollow shaft. It is possible, too to deliver our gears in stainless type. If you need any other type or size, which you can not fing in our catalogue, do not hesitate to cantact us.

Type H

The compact nad stable construction guarantees highest power an smallest dimension and little weight. Because of the lubrication for duration of life, dependend on the gear-size, the gears are maintenance free, under normal application.
The gear housing is made of casting GGG50. The storage of the shafts is made by taper roller bearings which guarantees a long duration of life.
The toothing is a Glearson helix toothing for highest torques. Because of the contact refelction-optimized assembly mounting, an equal tooth load can be reached. Through this measures a very high efficiency of 98° can be reached.
The serie H embraces 8 sizes from type H075 to type H280.
The gear reductions are 1:1, 1,5:1, 2:1, 3:1, 4:1 and 5:1. The entrance number of revolution can go up to 6000RpM, dependend on the size.

Type K

The bevel gears are helix toothed and hardened. The gear housing can be made of Alu, steel or casting GGG50. The storage is a well dimensioned bearing. The advantage of the type K are the gearfeet which are casted in one piece with the housing, to allow a simply fitting, because it is possible to fit with screws fromthe above side.
The gears are filled with oil or ghrease.
The serie contents aof 4 sizes from type K80 to type K70.
The effeciency from this serie goes up from 80% to 85%.
It is possible to deliver gears from two shafts to four shafts.
The gear reductions are 1:1, 2:1 and 3:1.

Mountain and Operating Instruction

The operating and mounting instructions you can find enclosed each delivery.

Performance Table Type H

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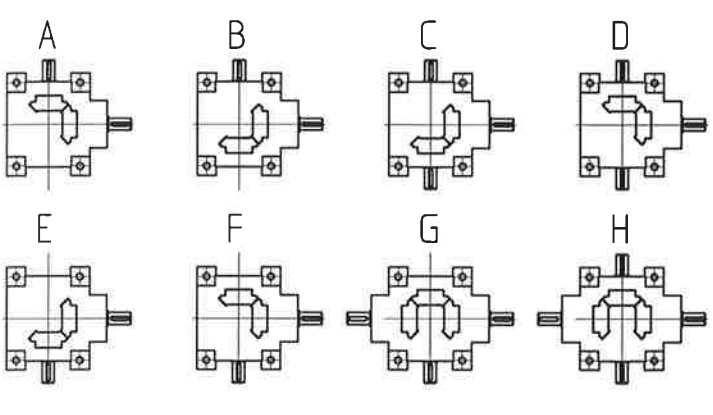
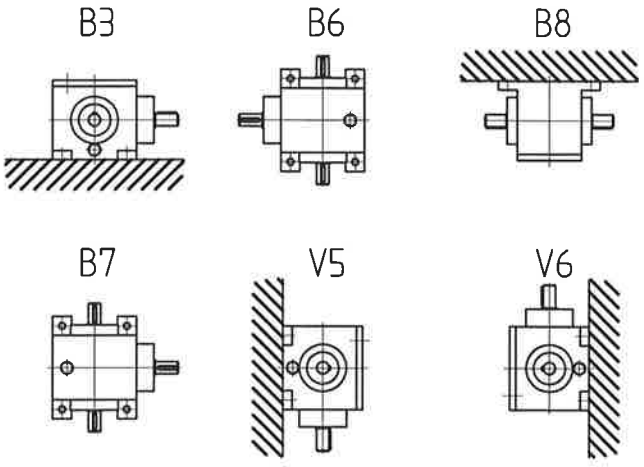
i	Title	Unit	H75	H90	H110	H140	H170	H210	H240	H280
1:1	Nominal torque M2	Nm	45	78	150	360	585	1300	2150	3200
	max. permissible torque M2*		68	117	225	540	878	1950	3225	4800
1,5:1	Nominal torque M2	Nm	45	78	150	360	585	1300	2150	3200
	max. permissible torque M2*		68	117	225	540	878	1950	3225	4800
2:1	Nominal torque M2	Nm	42	68	150	330	544	1220	2010	3050
	max. permissible torque M2*		63	102	225	495	816	1830	3015	4575
3:1	Nominal torque M2	Nm	33	54	120	270	450	1020	1650	2850
	max. permissible torque M2*		50	81	180	405	675	1530	2475	4275
4:1	Nominal torque M2	Nm	28	52	100	224	376	860	1410	2300
	max. permissible torque M2*		42	78	150	336	564	1290	2115	3450
5:1	Nominal torque M2	Nm	25	40	85	196	320	740	1210	2000
	max. permissible torque M2*		38	60	128	294	480	1110	1815	3000
	max. rpm at input	rpm	6500	5500	4500	3500	3000	2200	2000	1700
at 2% max Load standard output backlash		arcmin	6 bis 15	6 bis 14	6 bis 13	6 bis 13	6 bis 12	6 bis 12	6 bis 12	6 bis 11
at 2% max Load minmal output backlash		arcmin	5 bis 6	4 bis 6	4 bis 6	3 bis 6	3 bis 6	3 bis 6	3 bis 6	3 bis 6
Force contact point is midth of shaft	Permissible Radial Load Input Shaft d1	N	900	1.300	2.000	3.500	5.000	8.500	11.000	15.000
	Permissible Radial Load Output Shaft d1	N	1.100	1.600	2.500	4.500	6.000	10.500	15.000	18.000
	Permissible Axial Load Input Shaft d1	N	450	650	1.000	1.750	2.500	4.250	5.500	7.500
	Permissible Axial Load Output Shaft d1	N	550	800	1.250	2.250	3.000	5.250	7.500	9.000
Efficiency at max. Load		%	> 98							
Running Noise at 1500rpm, Partial Load		db(A)	70	74	76	77	78	80	82	83
Weight		kg	4,5	8	13	22	38,5	71	103,5	155
Service Live		h	> 15.000							
Lubrication			up to and including H140: Synthetic Lubrication Oil, ISO VG 150							
Operating Temperature			-30°C up to 100°C							

Arrangement of Shafts (Type H and K):



Fitting Position (Type H and K):



Performance Table Type K

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i	Title	Einheit	K32	K52,5	K61,5	K70
1:1	Nominal torque M2	Nm	7,5	35	63	232
	max. permissible torque M2*		11,25	52,5	94	348
2:1	Nominal torque M2	Nm	5,8	34	68	216
	max. permissible torque M2*		8,7	51	102	324
2,5:1	Nominal torque M2	Nm	-	-	-	162
	max. permissible torque M2*		-	-	-	243
3:1	Nominal torque M2	Nm	6,6	30	62	-
	max. permissible torque M2*		10	45	93	-
max. rpm at input		rpm	3000	1500	2000	1500
at 2% max Load standard output backlash		arcmin	30	30	30	30
Force contact point is midth of shaft	Permissible Radial Load Input Shaft d1	N	100	200	500	1.200
	Permissible Radial Load Output Shaft d1	N	100	250	800	1.650
	Permissible Axial Load Input Shaft d1	N	40	50	100	405
	Permissible Axial Load Output Shaft d1	N	80	160	290	635
Material			AL	ST or GG		
Efficiency		%	> 80			
Running noise		db(A)	75	78	78	78
Weight		kg	1,1	5,5	9	27
Service Life		h	> 10000			
Lubrication			Grease or Oil			
Temperature			-30°C up to 100°C			

*** temporary**

Thermal performance limit (Type H and K):

Type	K32	K52,5	K61,5	K70	H75	H90	H110	H140	H170	H210	H240	H280
Thermal Performance Limit (Kw)	2,3	4	7,9	12	5,5	7,4	10,8	16,1	23,4	28,6	45,3	60,3

The gearbox performance is limited by the maximum allowable oil bath temperature. The required effective performance must not exceed the lkimit values allowed for continuous duty.

Duty Cycle per Hour %	100	80	60	40	20
Factor	1	1,2	1,4	1,6	1,8

If on intermitted duty or in the event of increased ambient tempereature, the following factors can be applied as guide values for the determination of the related allowable thermal performance limit.
Duty cycle per hour in %

Duty Cycle per Hour %	100	80	60	40	20
Factor	1	1,2	1,4	1,6	1,8

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Performance P [kW] at n_{input} [rpm] (P_{input} - $P_{output\ at\ h > 98\%}$)
Gear Ratio i
Speed n_{input}; $n_{output} = n_{input} : n$

Output Torque M_{output} [Nm] = (9550 x P_{output}): n_{output}

Output Torque M_{output} < Nominal Torque $M2_{Nominl}$

Maximum Output-torque $M_{output\ max}$ < Maximum permissible Outputtorque $M2_{max}$
at up to 10 start-ups per Minute

Maximum Output Torque $M_{output\ max}$ < Nominal Torque $M2_{nominal}$
at up to 60 start-ups per Minute

Maximum values for start numbers ranging between 10 to 60 start-ups will be interpolated

Speed n_{input} < Speed n_{1max}

Performance P < Thermal Performance Limit P_{therm} (20°C, 100% ED)
Thermal performance limit changes with deviating temperature values and duty times according to factor indicated in the table on page 5

radial and axial
Shaft Loads < permissible values FQ1, FQ2, FA1, FA2
From table on page 4 and 5 (Force contact point is midth of shaft, to realize higher values, a re-calculation mast be made

Example: given: n1 = 3000 rpm
Distributiongearbox n2 = 750 rpm
P = 15,5 kW
ED = 100%
Ambient temperature = 20°C

Selection: i = n1 / n2 i = 3000 rpm : 750 rpm
i = 4:1

M2 = 9550xP / n2 M2 = 9550 x 15,5 : 750
M2 = 197,37
Gear box H140 4:1

$M2_{exist}$ < $M2_{nominal}$ $M2_{exist}$ 197,37 Nm < $M2_{nominal}$ 224 Nm
$n1_{exist}$ < $n1_{max}$ 3000 rpm < 3500 rpm max
P_{exist} < P_{therm} P = 15,5 kW < P_{therm} 16,1 kW

Selected: H140 4:1

Bevel Gear Box K32

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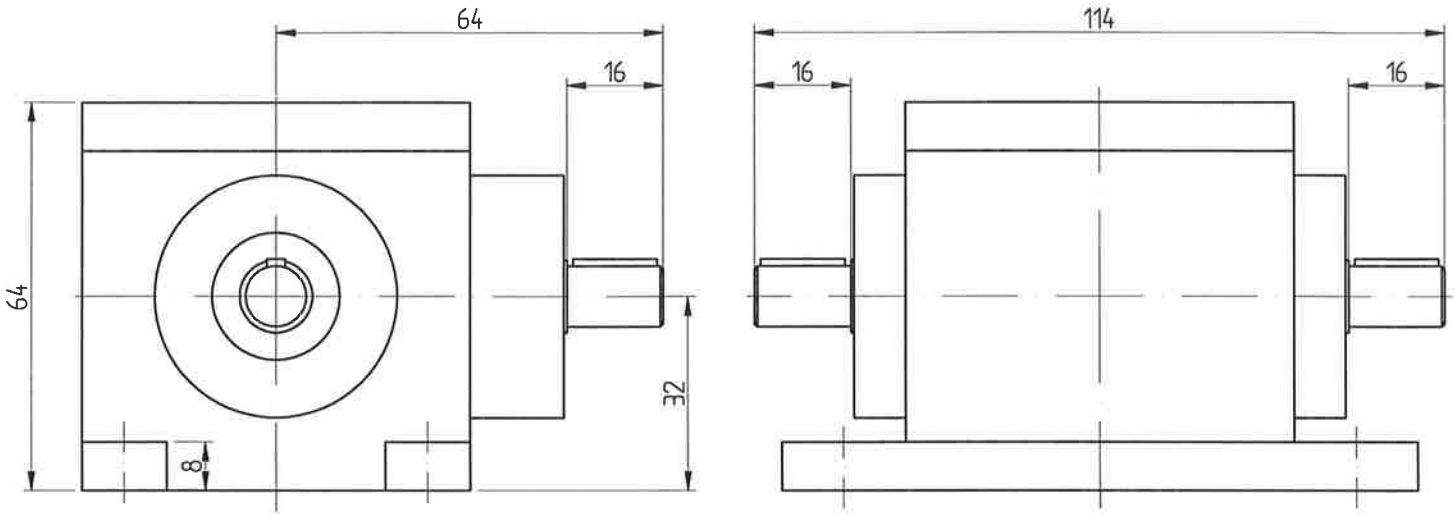

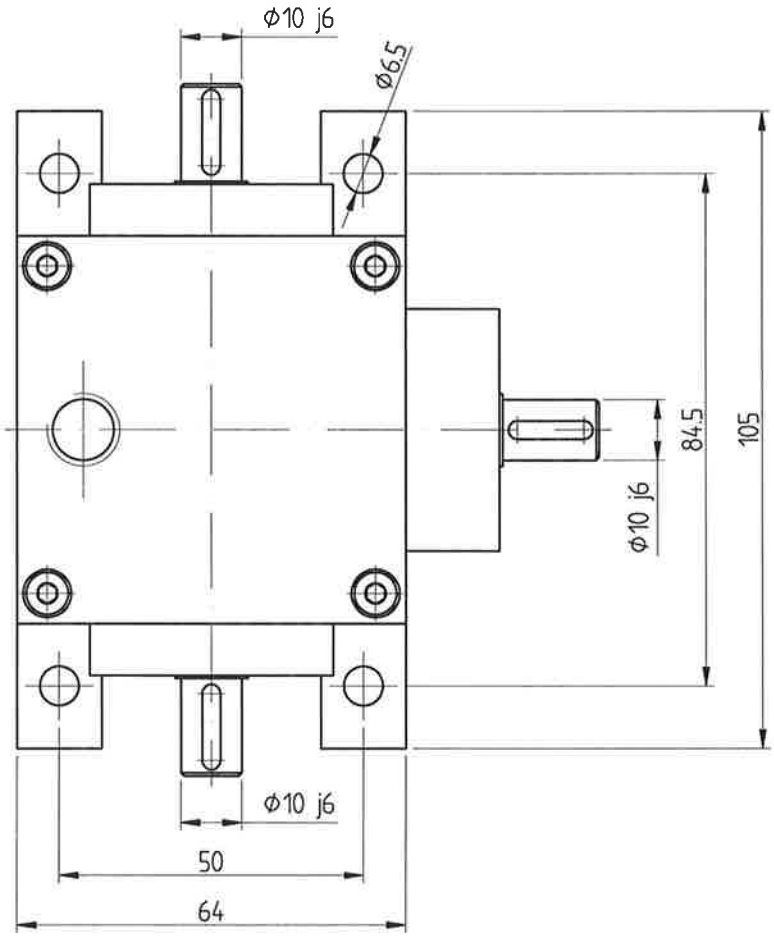

Bevel Gear Box K 52,5

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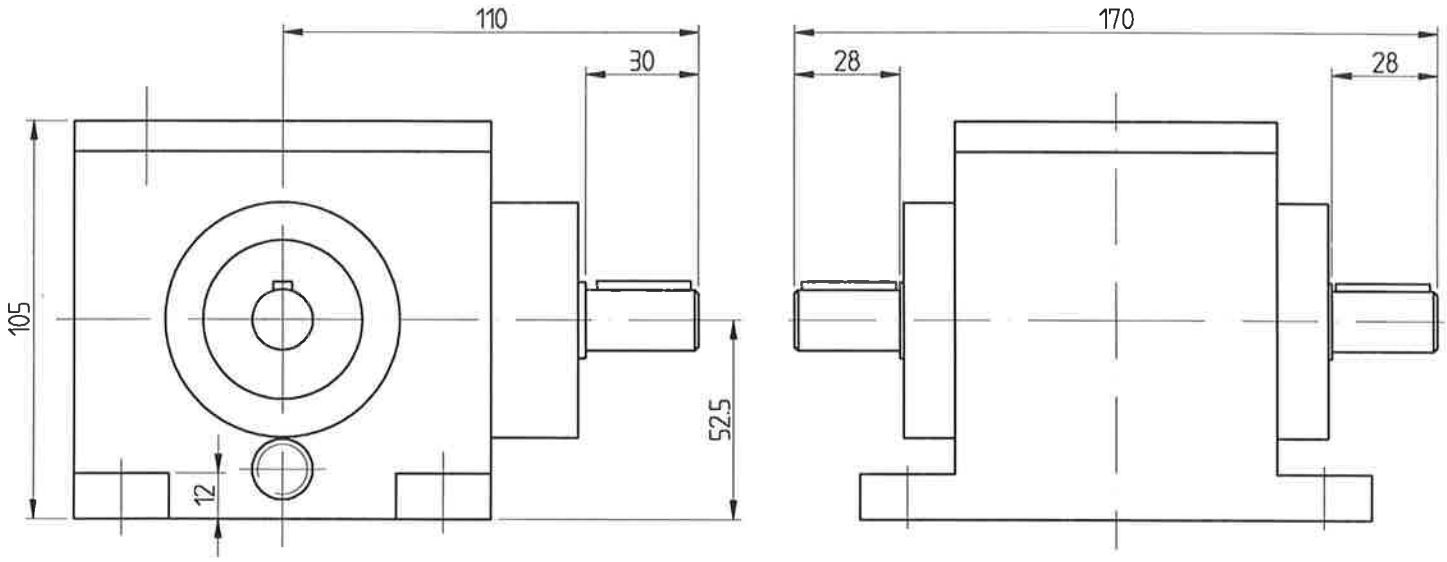

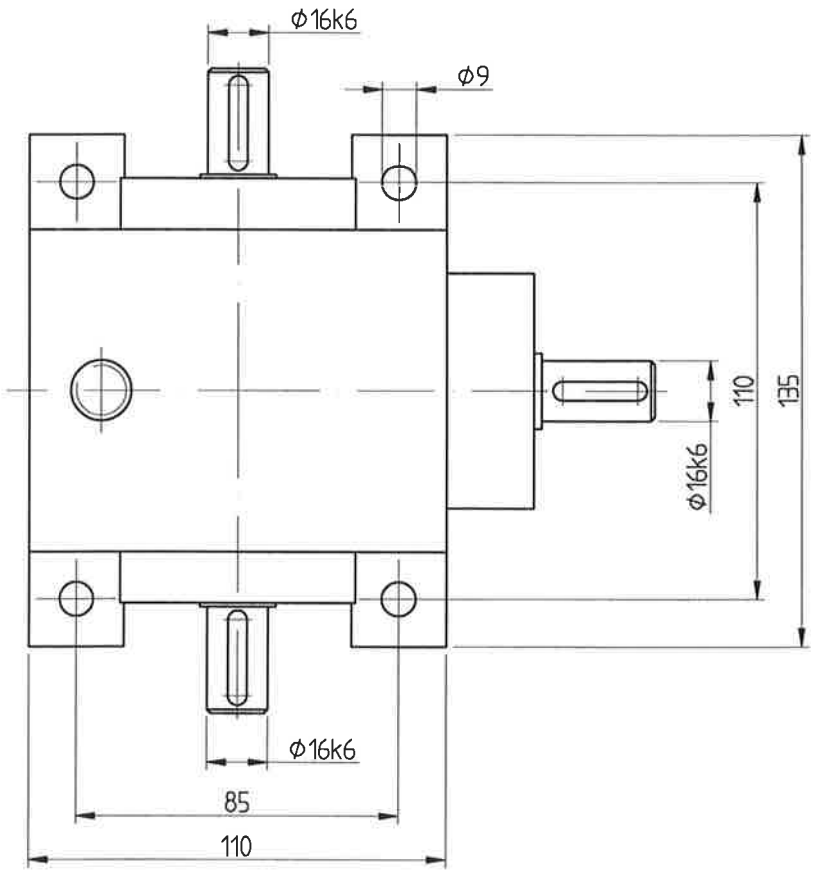

Bevel Gear Box K 61.5

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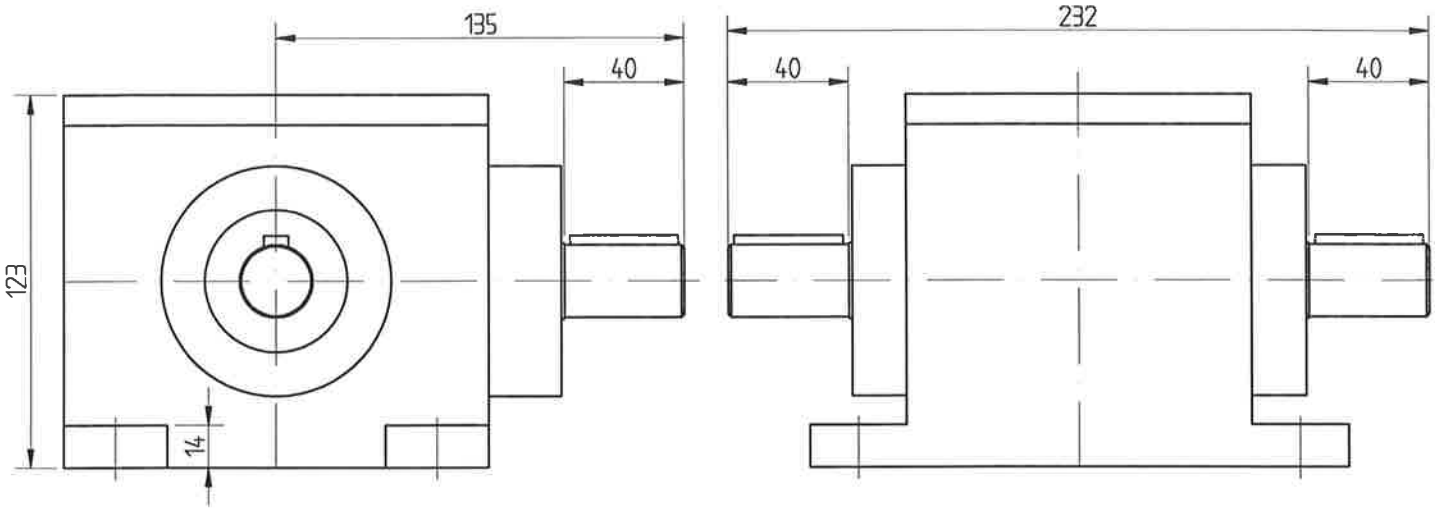

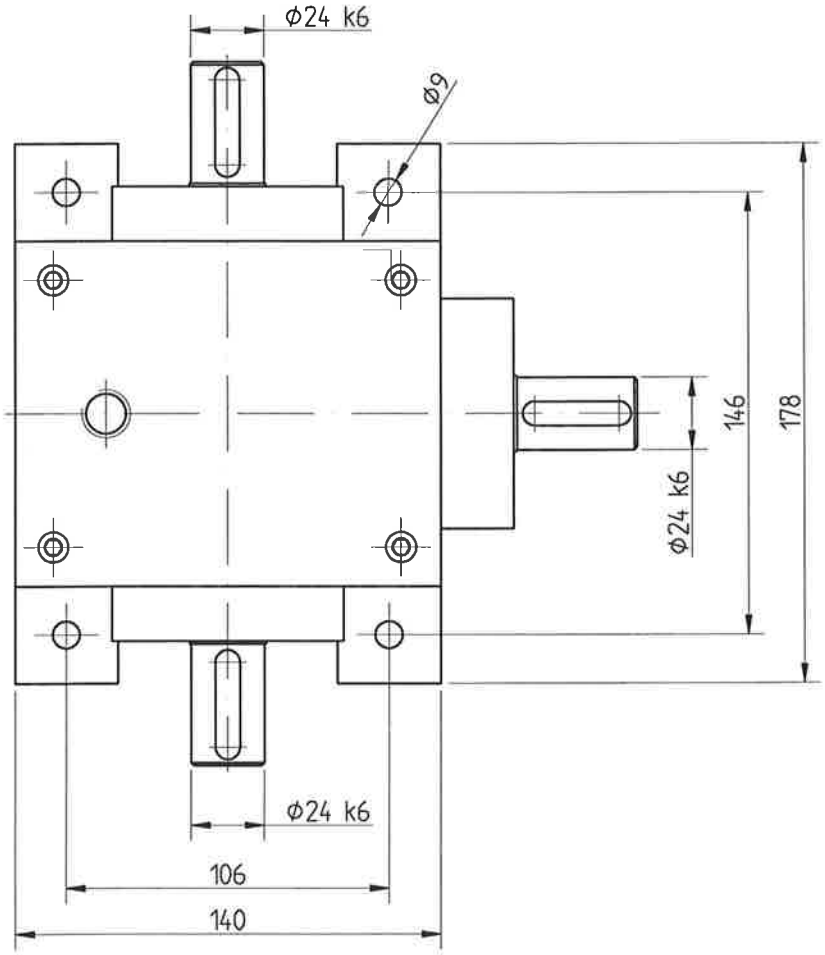

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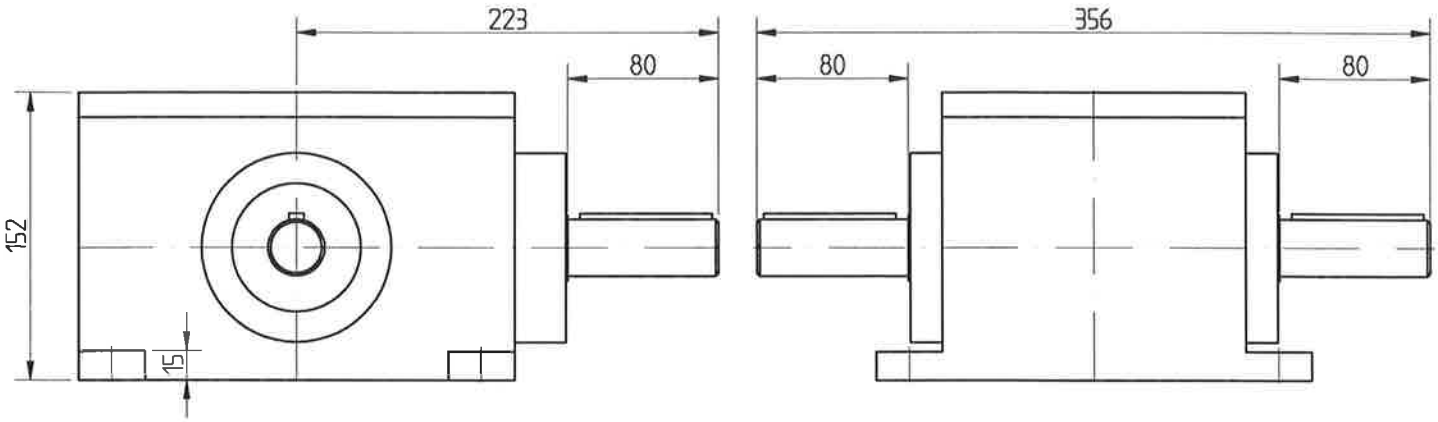

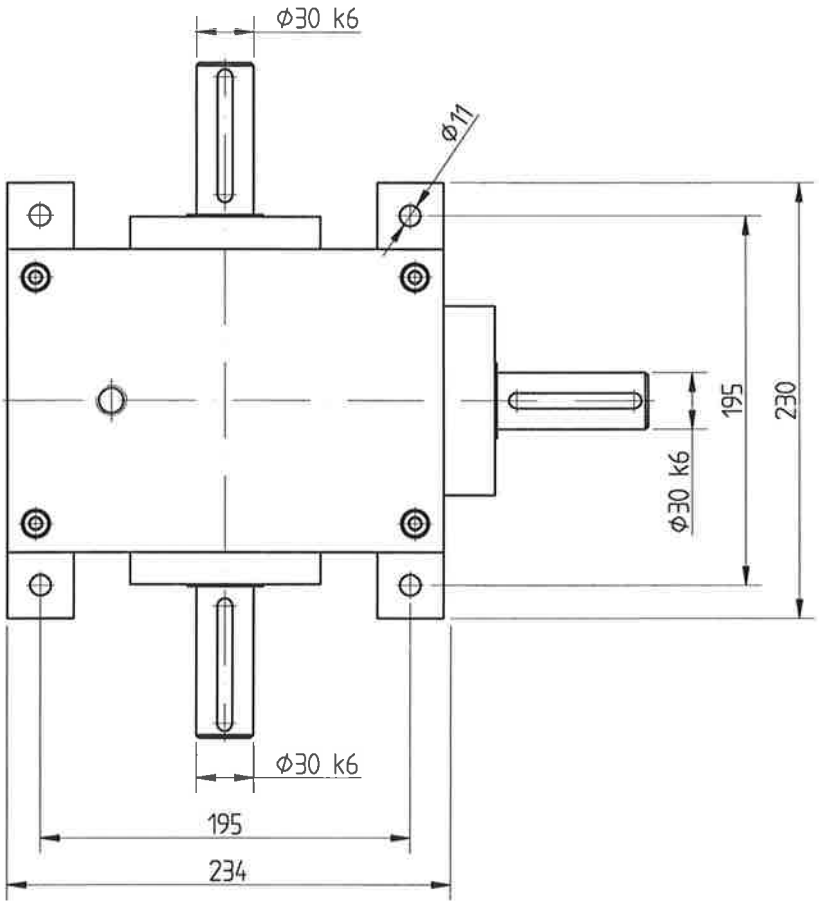

Bevel Gear Box H075

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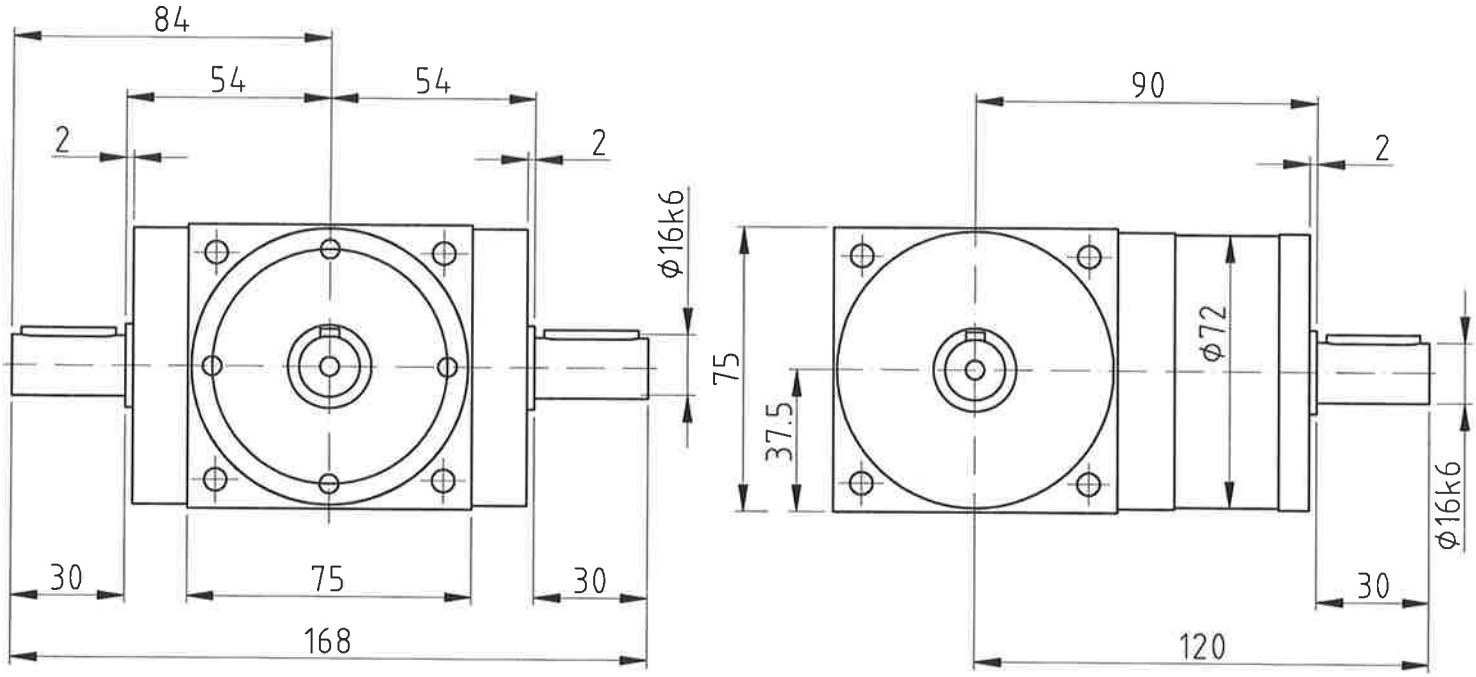

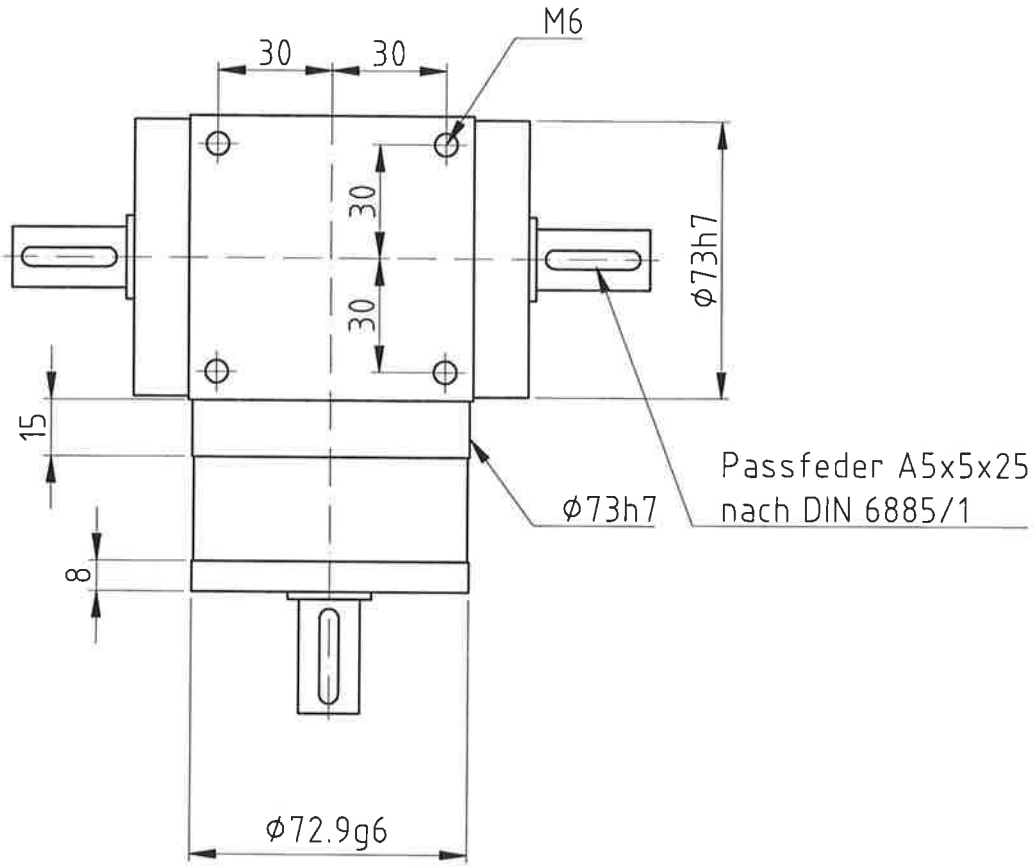

Bevel Gear Box H090

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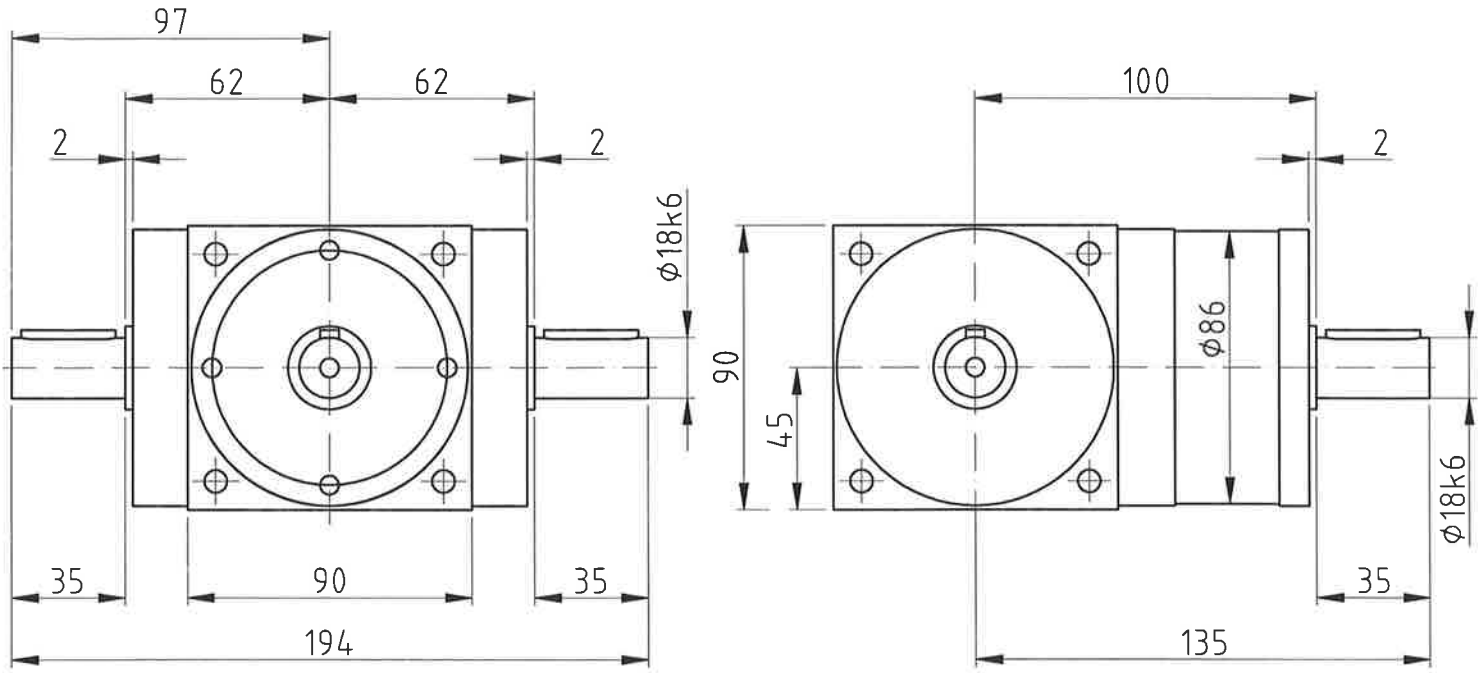

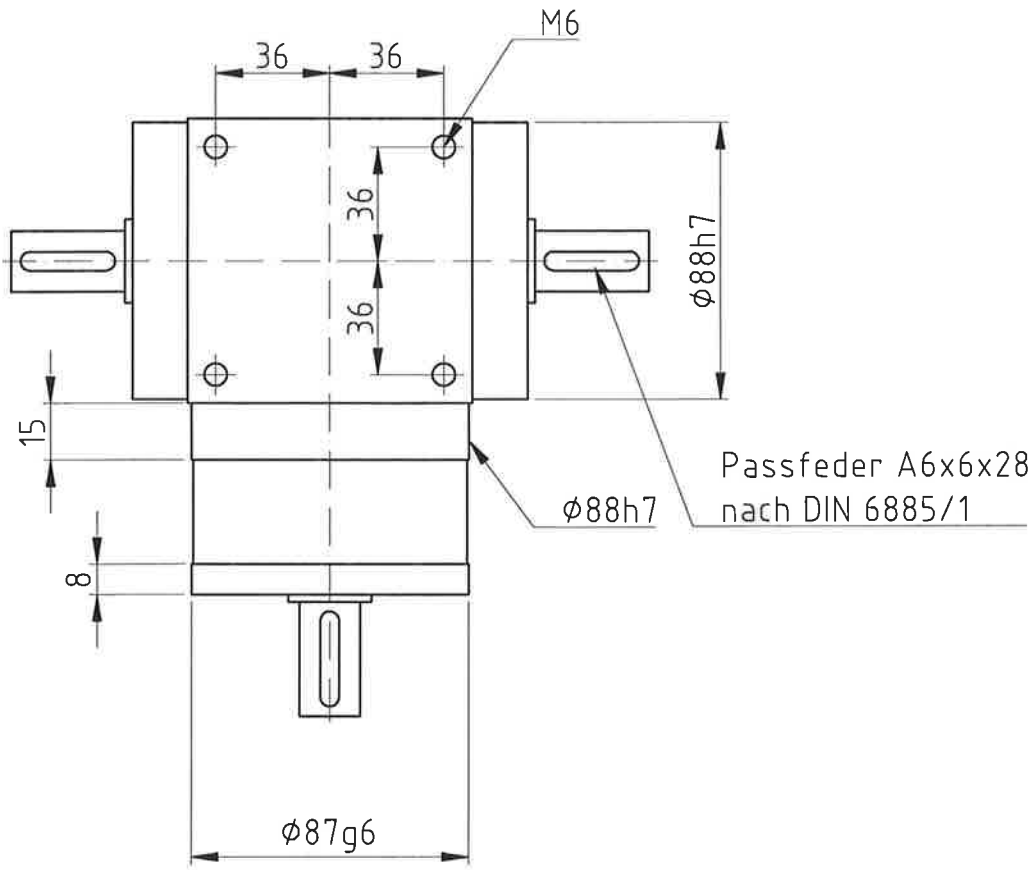

Bevel Gear Box H110

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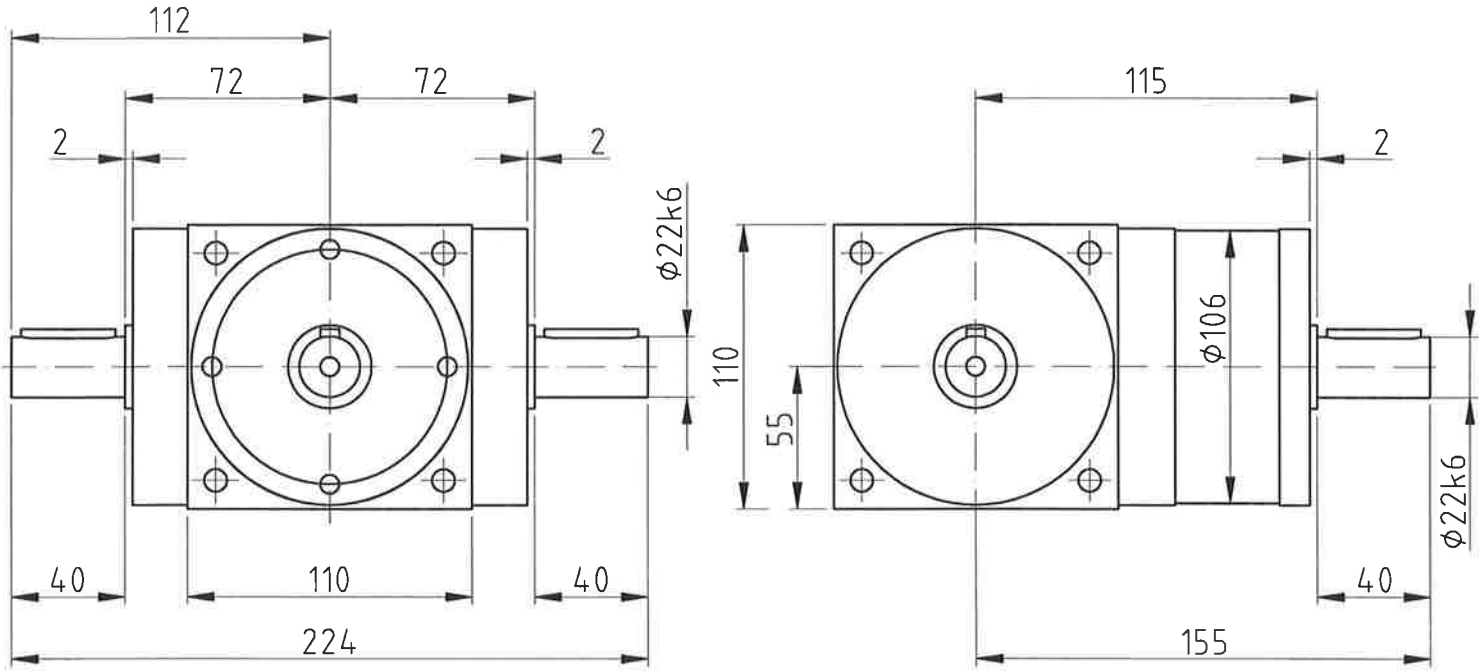

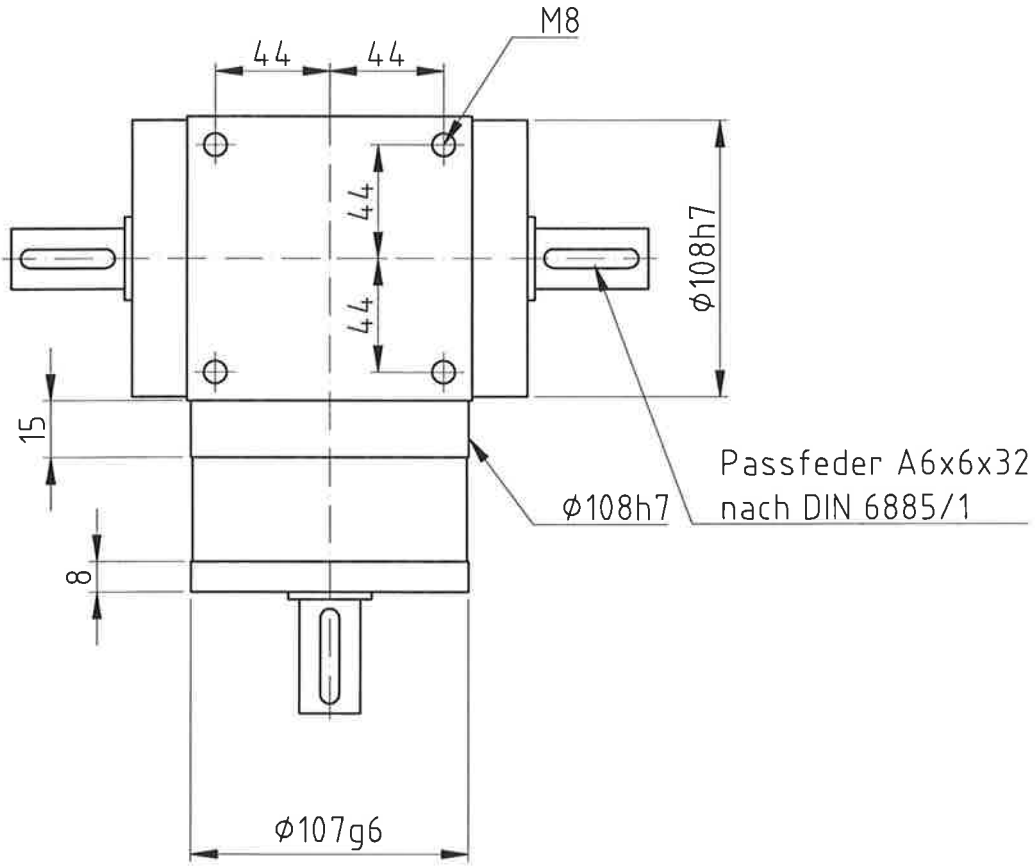

Bevel Gear Box H140

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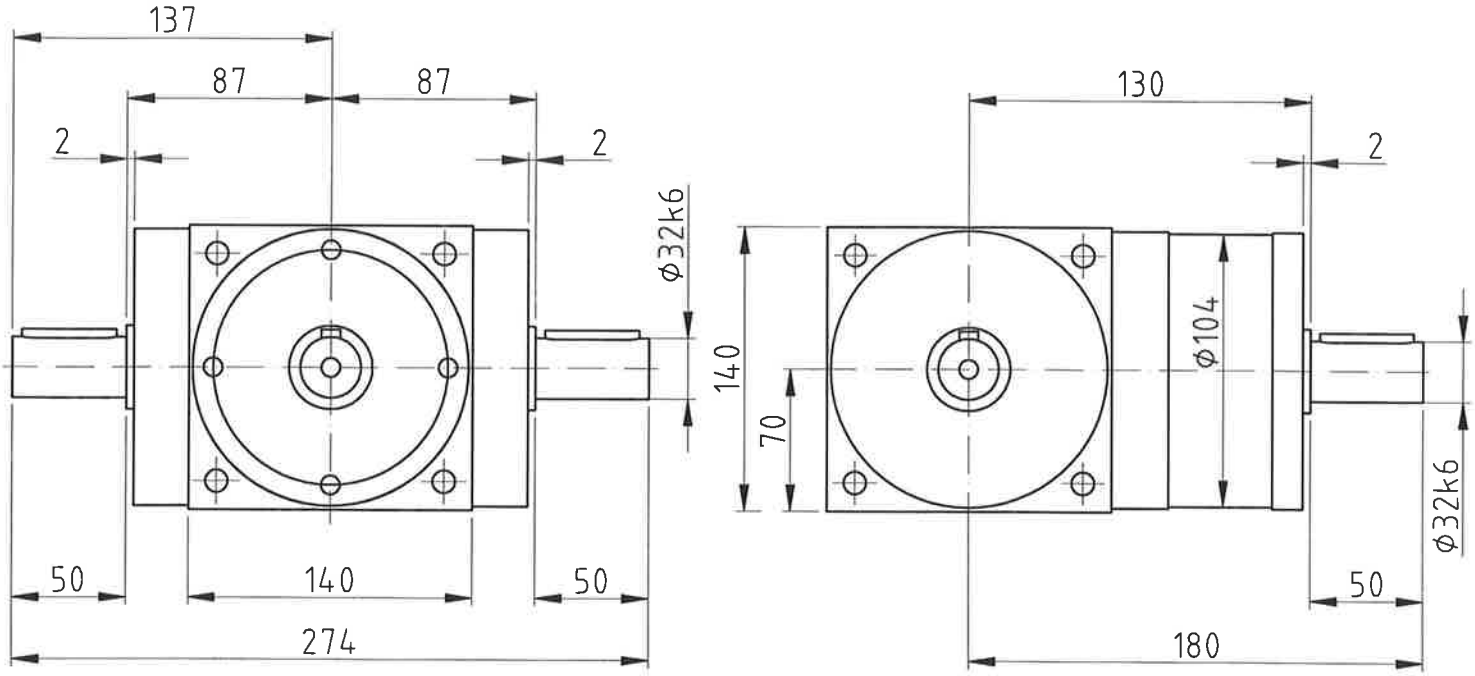

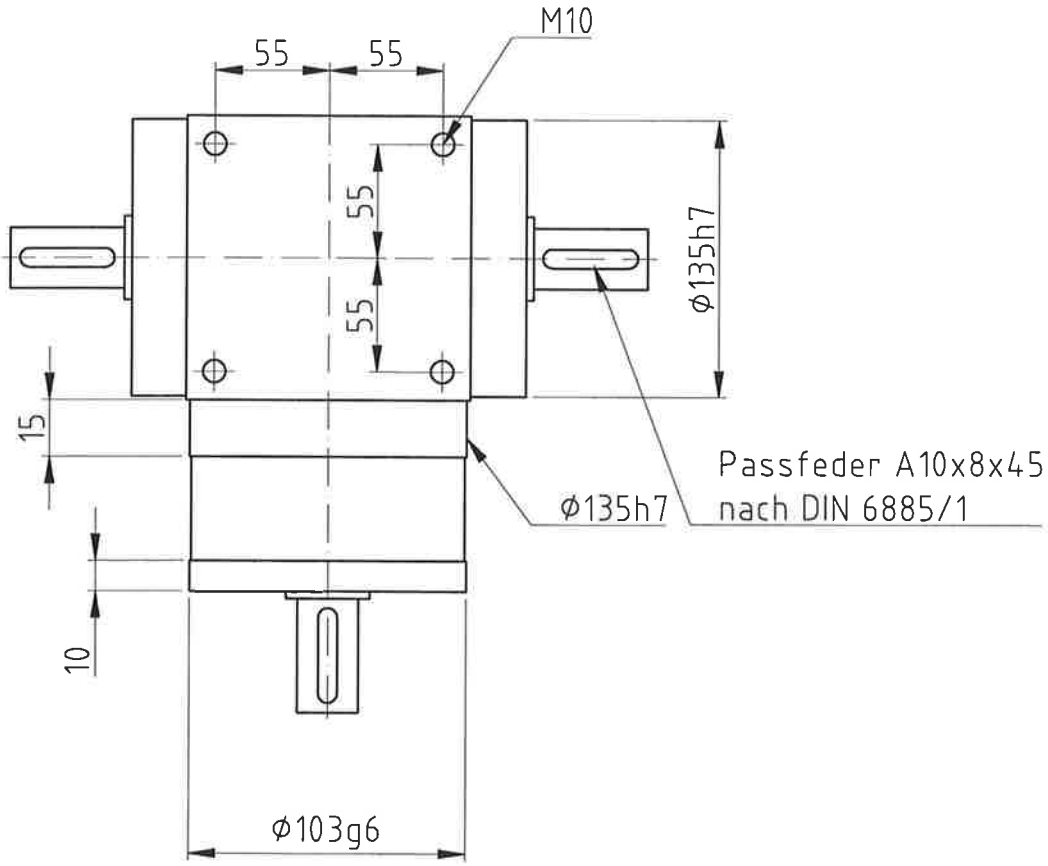

Bevel Gear Box H170

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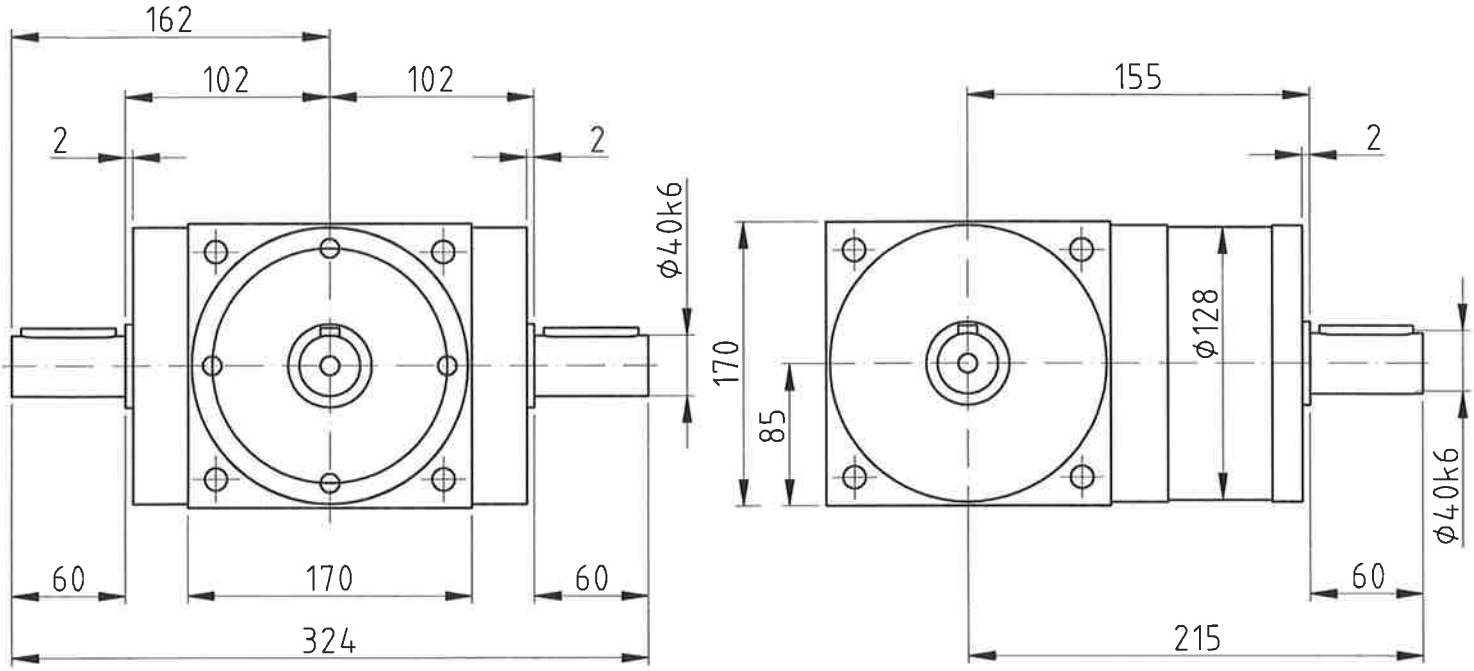
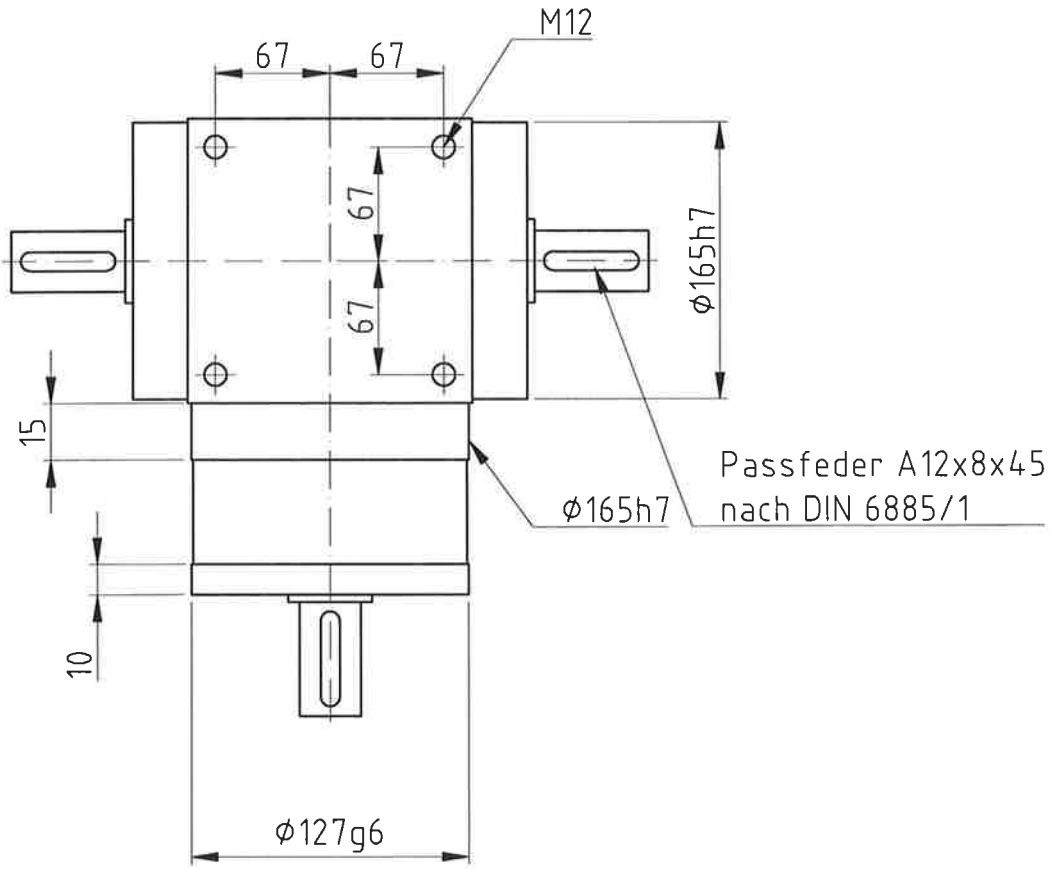
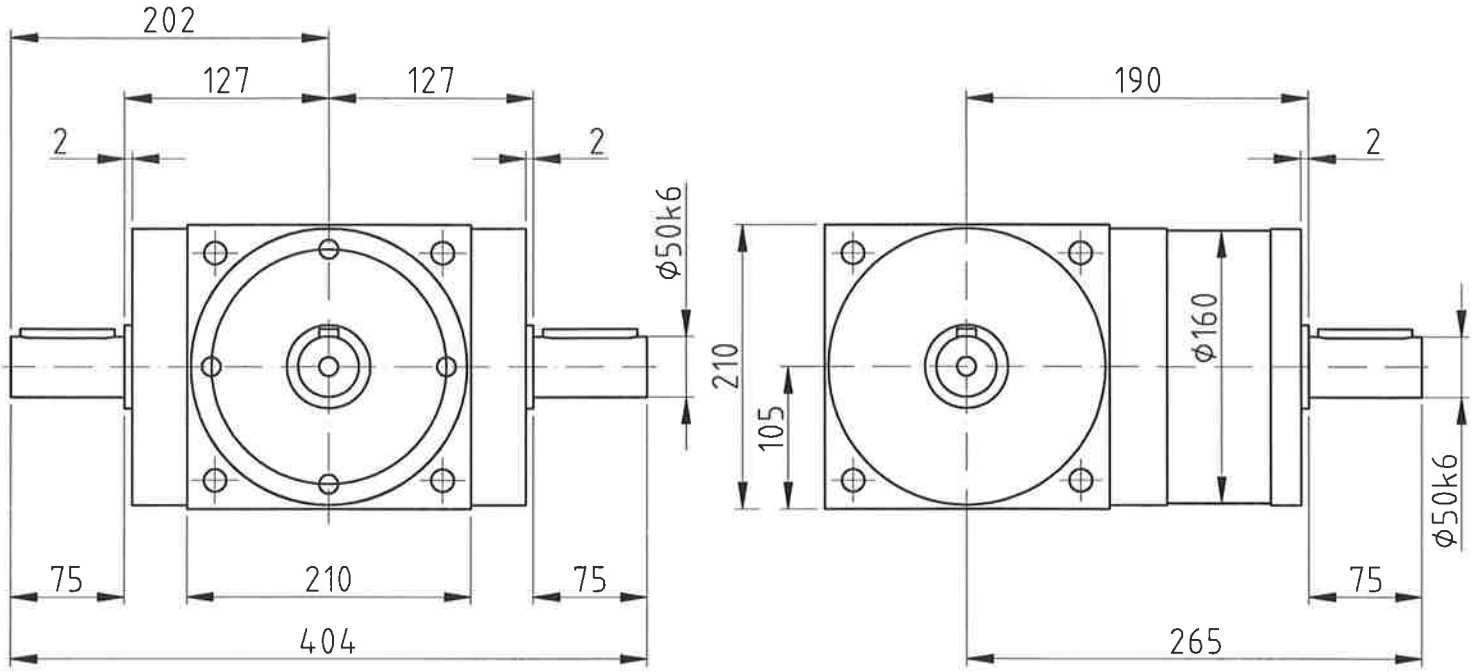
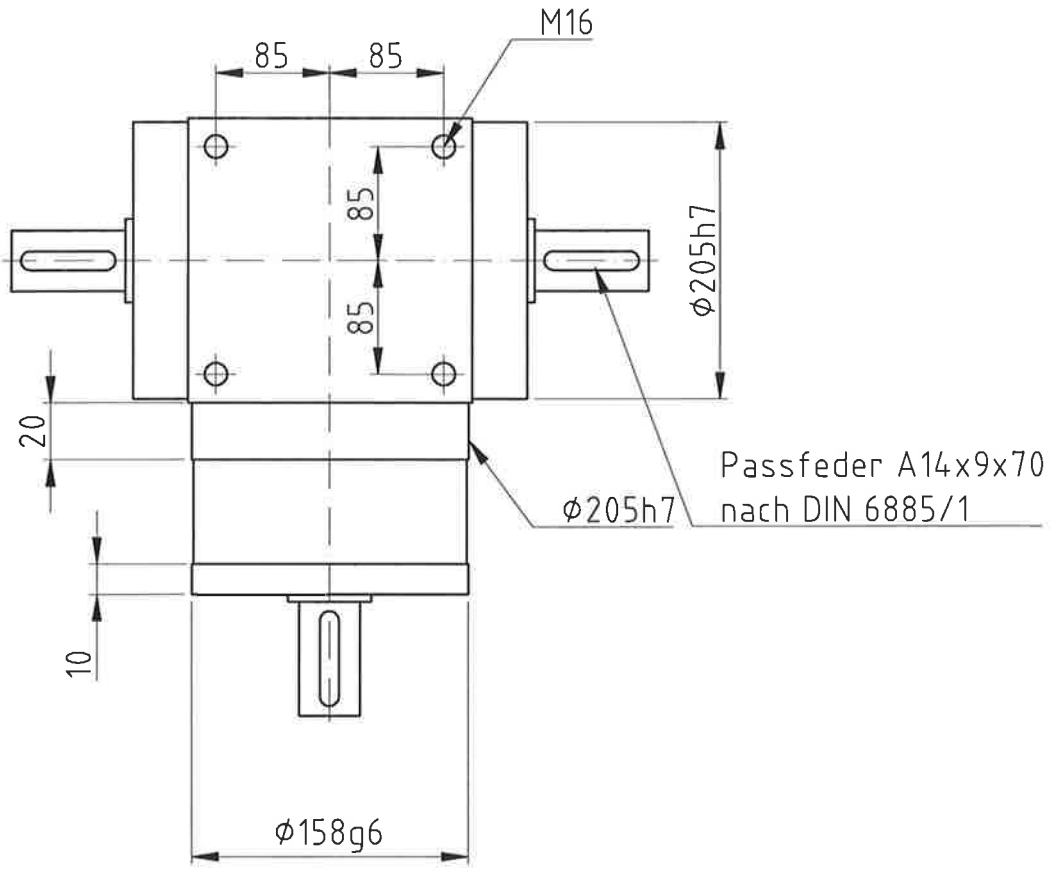




Bevel Gear Box H210

ENZFELDER GMBH
Power transmission- and lifting engineering
Eichengasse 36
A-2551 Enzesfeld-Lindabrunn
Tel.: ++43 (0) 2256 81287-0
Fax: ++43 (0) 2256 81287-95
E-Mail: office@enzfelder.at
Internet: www.enzfelder.at





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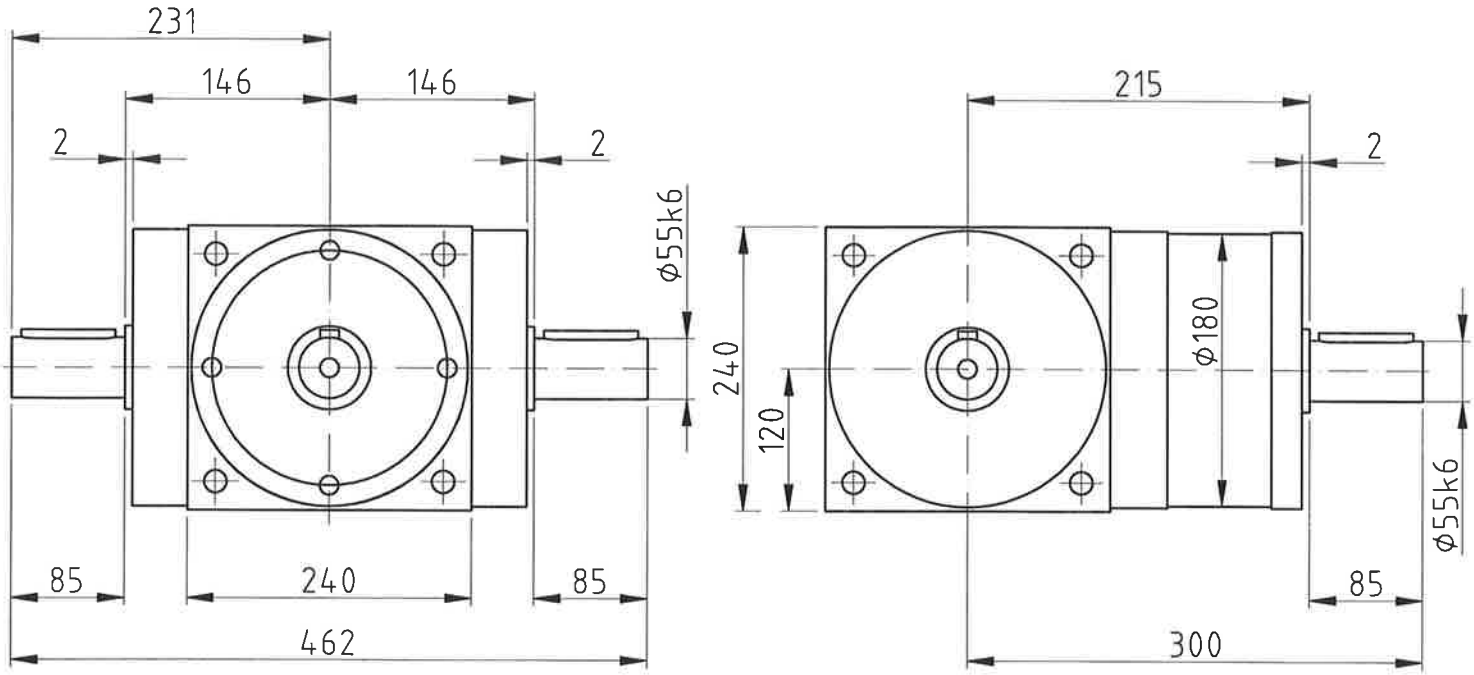
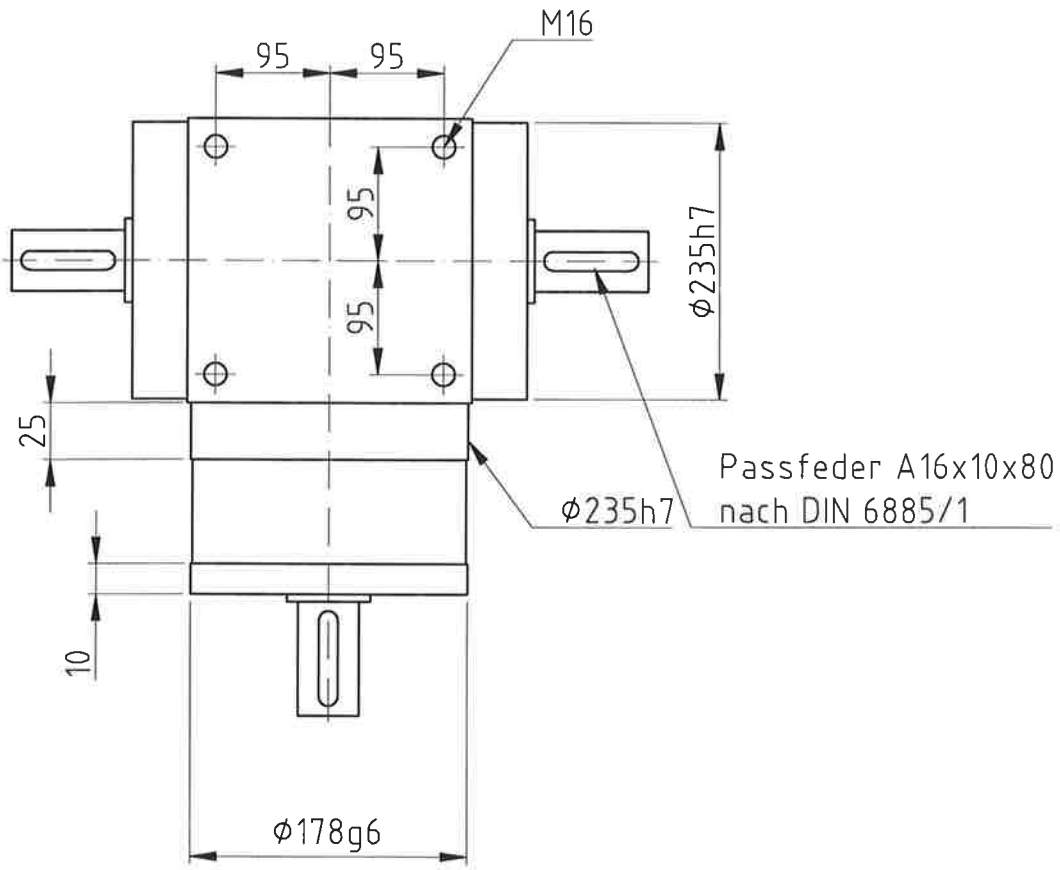
Internet: www.enzfelder.at

Bevel Gear Box H240





Bevel Gear Box H280

ENZFELDER GMBH
Power transmission- and lifting engineering
Eichengasse 36
A-2551 Enzesfeld-Lindabrunn
Tel.: ++43 (0) 2256 81287-0
Fax: ++43 (0) 2256 81287-95
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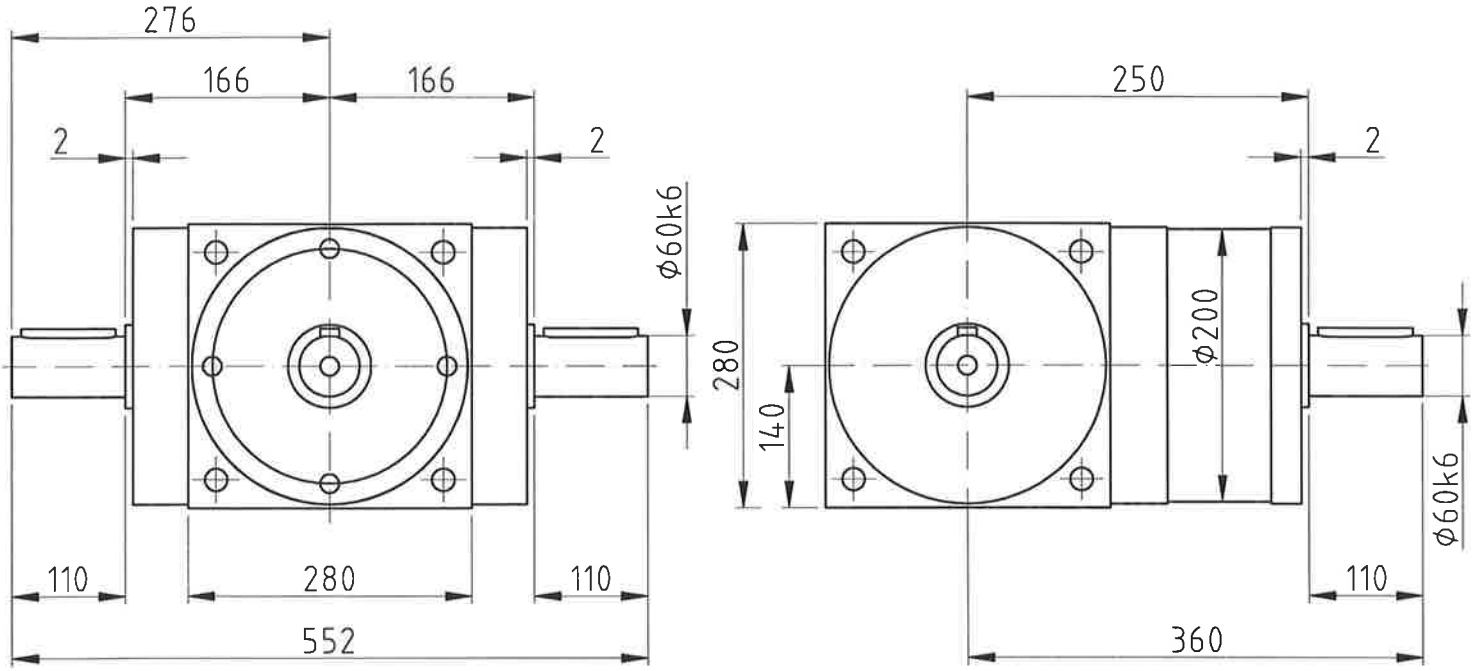
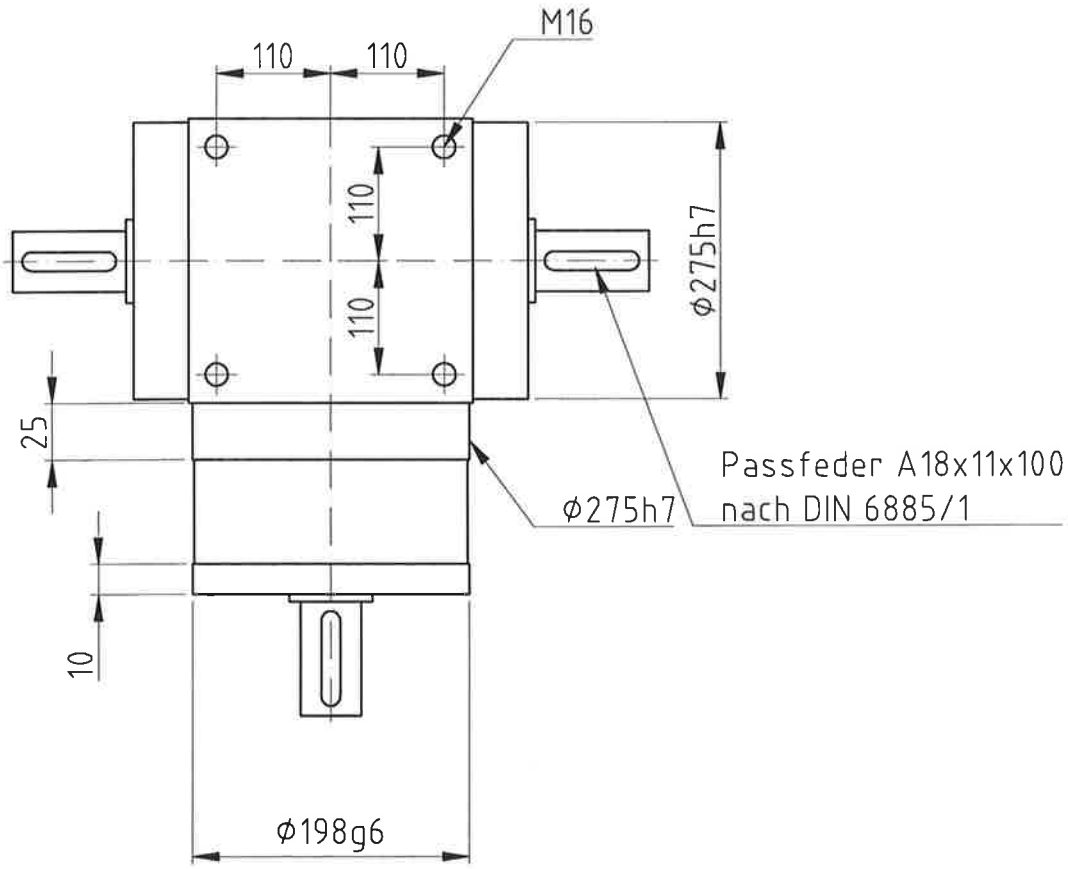
Internet: www.enzfelder.at

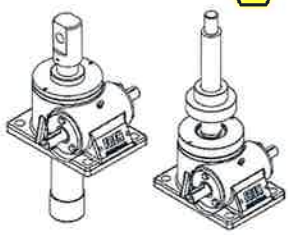




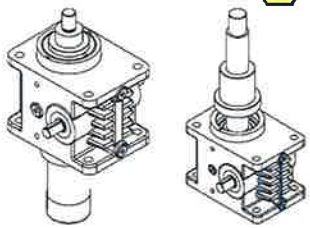
Product overview 03/2015

Eichengasse 36, A-2551 Enzesfeld, Tel.: +43 (0) 2256 81287 - 00, Fax.: +43 (0) 2256 81287 - 95, office@enzfelder.at, www.enzfelder.at

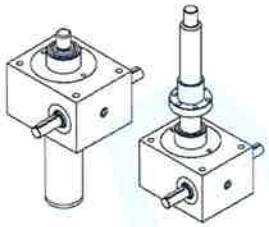
SG
Screw jack
Classic



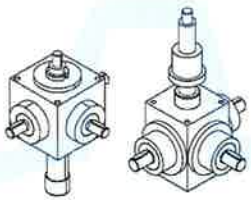
HSG
High performance-
Screw jack



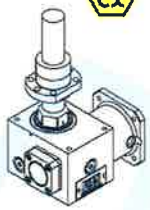
BG
Screw jack
Cubic



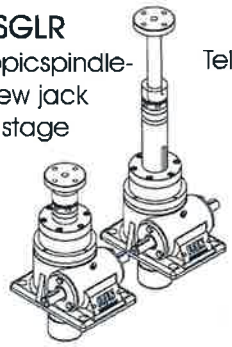
SHG
Quick-lifting
screw jack



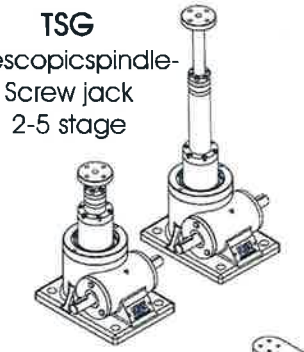
SH
Servo lifting
gear



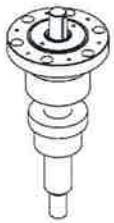
TSGLR
Telescopicspindle-
Screw jack
2-stage



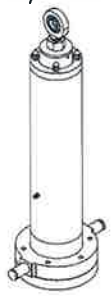
TSG
Telescopicspindle-
Screw jack
2-5 stage



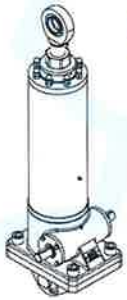
SLA
Spindlebearing



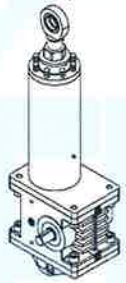
SEZ
Spindlebearings-
Cylinder



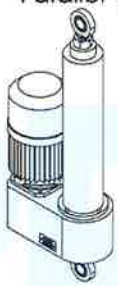
ELZ
Electric cylinder



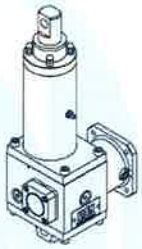
HELZ
High performance-
Elektric cylinder



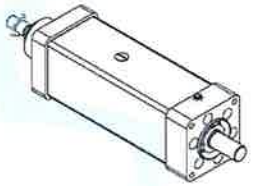
ELZP
Electric cylinder
Parallel



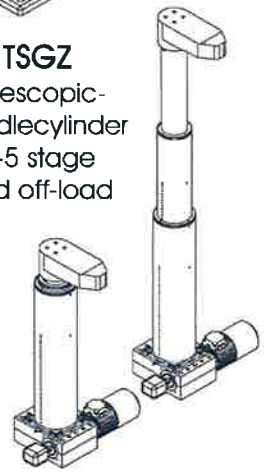
SHELZ
Servo electric-
cylinder



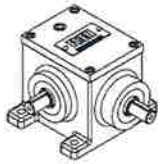
EPNEU
Spindle-
Elektric cylinder



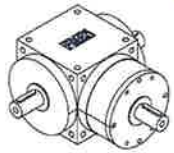
TSGZ
Telescopic-
spindlecylinder
2-5 stage
And off-load



K
Bevel gear
Type K

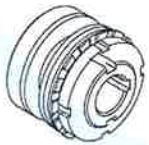


H
Bevel gear
Type H



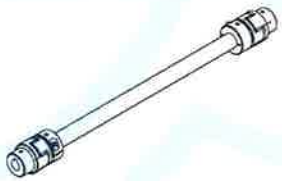
R / GS
Elastic / backlash-free
Coupling

RT
Slip hub

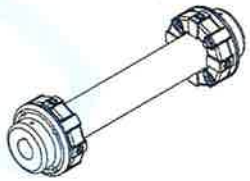


RK
Slip coupling

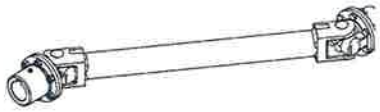
ZR
FREN
Connecting shaft



G / GX
Elastic
Connecting shaft

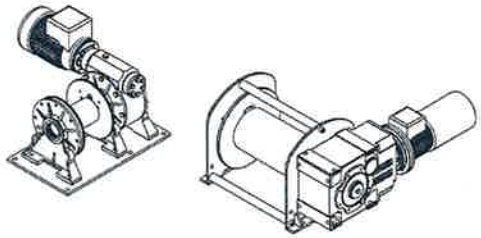


Cardan shaft



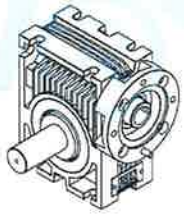
HT
Lifting table
mechanic / hydraulic

SW
Rope winche

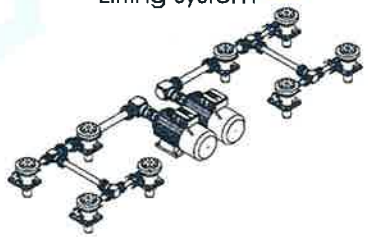


PLG
Planetary gear

uniCe
Worm gear



HA
Lifting system



Special gear