bj·gear

dedicated gear drive solutions

Spindle Gears

with Trapezoidal Spindle

/// Rotating spindle or rotating nut
/// Robust, compact and high quality
/// Modular design with great flexibility
/// Great opportunities of adaptation
/// Available in hygienic design
/// Possible in ATEX versions

Contents:

A Reliable Partner with Focus on Service

Today, BJ-Gear is one of the leading companies in developing, manufacturing and supplying gears, spindle gears, screw jacks, electromechanical cylinders and actuators.
We are producing a wide range of standard gears and besides we are keeping a strong position within adapted standard gears and special gears.
Besides, we offer motors, encoders, electromagnetic brakes and couplings etc. of recognized manufacture making it possible to supply complete transmission solutions at short notice.

The flexible production machinery - together with our modular designed product range – allows very short and precise delivery times, even when they are adapted products or special products.

The combination of innovation, know-how, high-technological production facilities and our focus on customer requirements make us a competent partner. We are certified according to EN ISO 9001:2008 and our products can be supplied according to task for zone 1, 2, 21 and 22 according to the Atex directive.

As an alternative to this brochure, you can use our website on www.bj-gear.com where you can have detailed information on our complete product programme. You can also online configure gears and download 2D and 3D drawings, brochures and other documentation.

BJ-Gear stands for reliable transmission solutions among others within Healthcare, Food Processing and Packaging, Aerospace and Defense, Offshore and Marine, The Energy and Environment sector and to many other business areas.

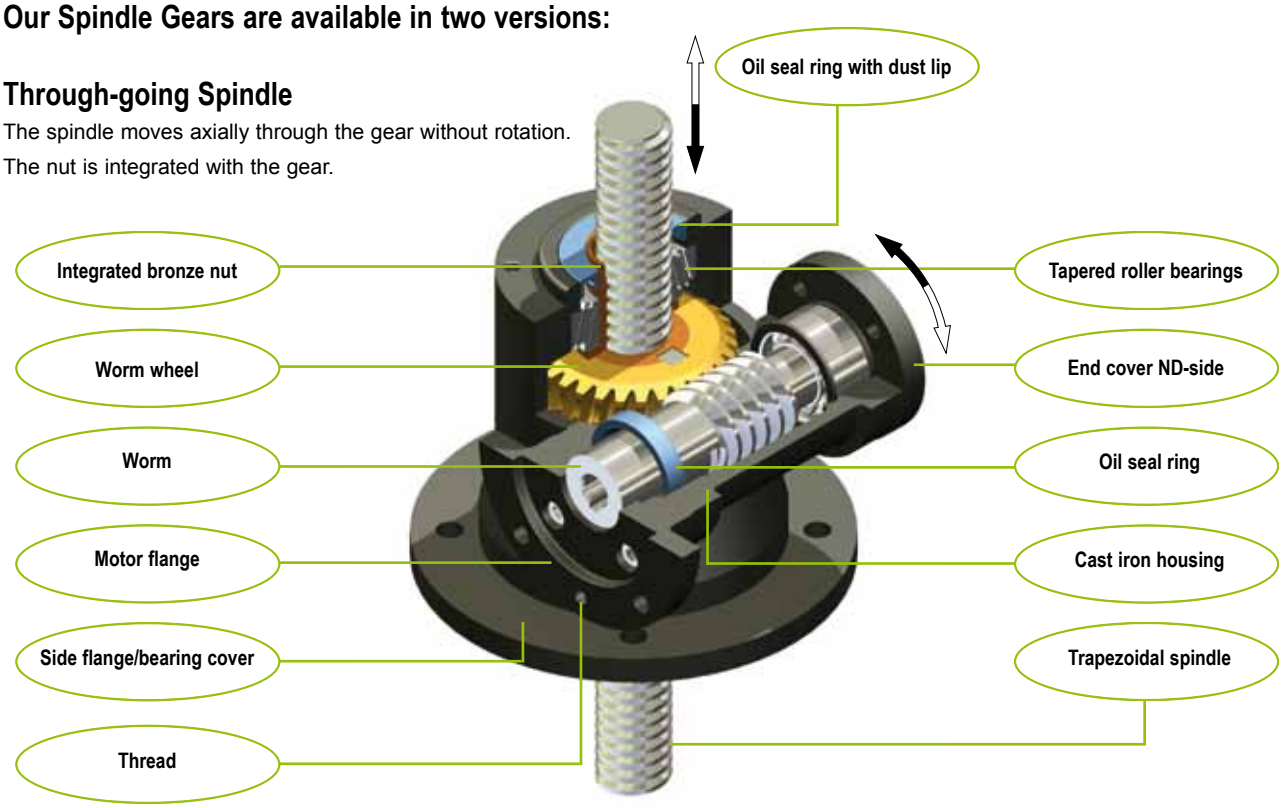
You are welcome to contact our specialists on +45 87 40 80 80 / bj@bj-gear.com or take a look at www.bj-gear.com if you want to know more about our company and products.

A BJ-Spindle Gears

Our Spindle Gears are available in two versions:

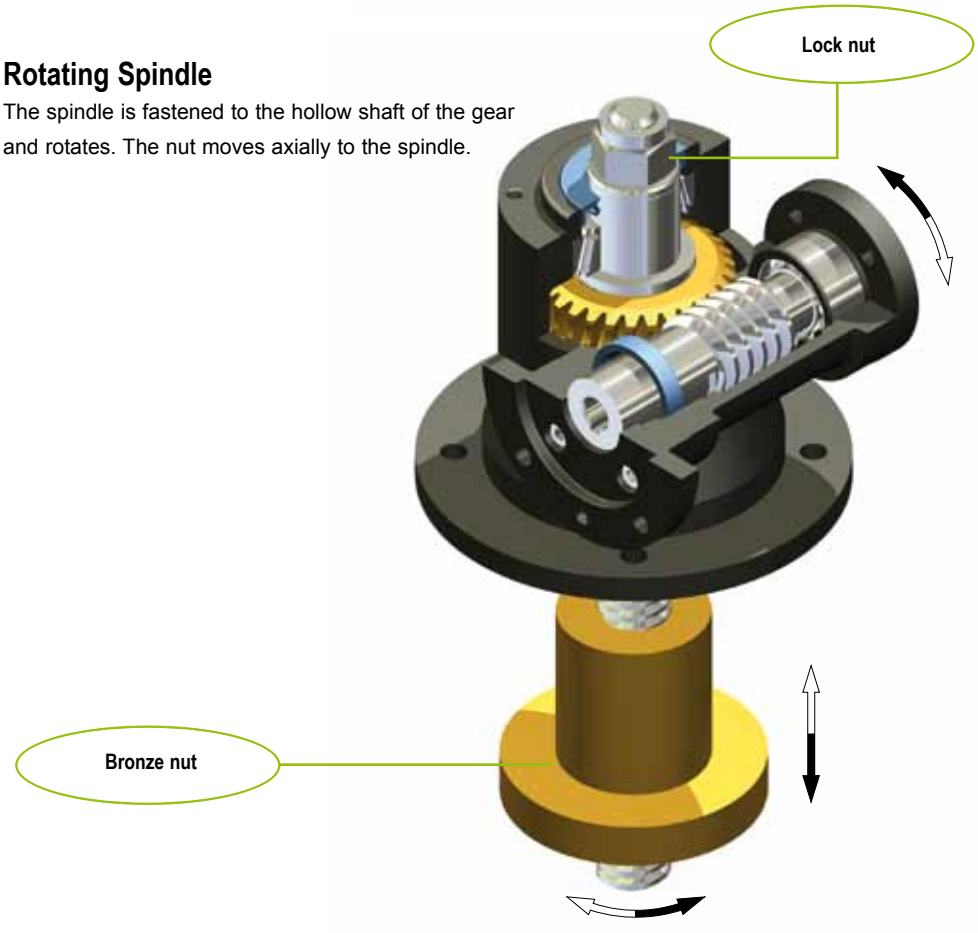
Through-going Spindle

The spindle moves axially through the gear without rotation.
The nut is integrated with the gear.



Rotating Spindle

The spindle is fastened to the hollow shaft of the gear and rotates. The nut moves axially to the spindle.



B Type Designation

Product Type
This product catalogue only comprises spindle gears with trapezoidal spindle referred to as 2.

Gear Size
The spindle gear is as standard available in 4 sizes with forces of up to 43 kN approx.

Gear Housing
The spindle gear is as standard with cast iron housing of high rigidity, good sound and vibration damping qualities and tight tolerances.

Bearing Cover / Side Flange
The bearing cover as the compact solution or the side flange allowing for mounting at the output shaft. Opportunity of adaptations.

Spindle Design
Trapezoidal hollow shafts in bronze for through-going spindle. Hollow shaft for rotating spindle (ordinary steel or stainless). Opportunity of adaptations.

D-side (Drive side)
Motor flange, coupling housing or cover. Opportunity of adaptations.

Worms
Worms for different kinds of motors or other driving units. Possibly a through-going worm with free worm shaft on the ND-side. The worm is made of high quality steel which is hardened and grinded. Opportunity of adaptations.

ND-side (Non Drive side)
On the ND-side it is possible to build on various accessories such as brakes, encoders etc. Opportunity of adaptations.

Gear Ratio
Indication of the gear ratio. The worm wheel of the gearing is made of high quality bronze with especially good qualities in relation to low friction, minimized wear and high strength.

Oil / Lubrication
Oils and grease for different operating temperatures and for special environments. The gear is as standard lifetime lubricated with fully synthetic oil. See page 12 for choice of oils / lubricants. See page 15 for lubrication of spindle.

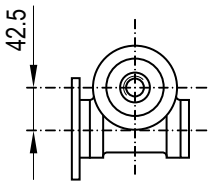
Finish
Surface treatment in different variants. Opportunity for customer specified selection of surface treatment and colour.

C Selection Guide

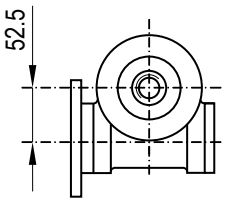
2	52	1	0	722	13	03	01	30	0	0

Spindle Gear Size

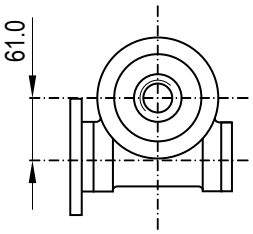
The BJ spindle gear is as standard made in 4 sizes with housing made of cast iron.



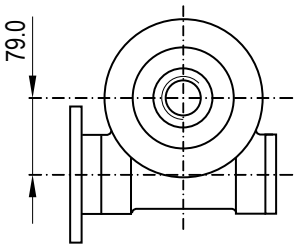
Series 42
TR 24x5



Series 52
TR 30x6



Series 61
TR 40x7



Series 79
TR 40x7

The individual sizes are numbered according to the centre distances between worm and worm wheel. A gear with a centre distance of 52.5 is designated Series 52 and is assigned number 52 on position No. 2 in the type designation.

Gear Ratio

BJ-spindle gears are as standard available with the following nominal gear ratios:

									Series 42 only		
No.	**07**	**10**	**15**	**20**	**30**	**40**	**50**	**60**	**05**	**25**	**75**
Gear Ratio	7:1	10:1	15:1	20:1	**30:1**	40:1	50:1	60:1	5,4:1	25:1	75:1

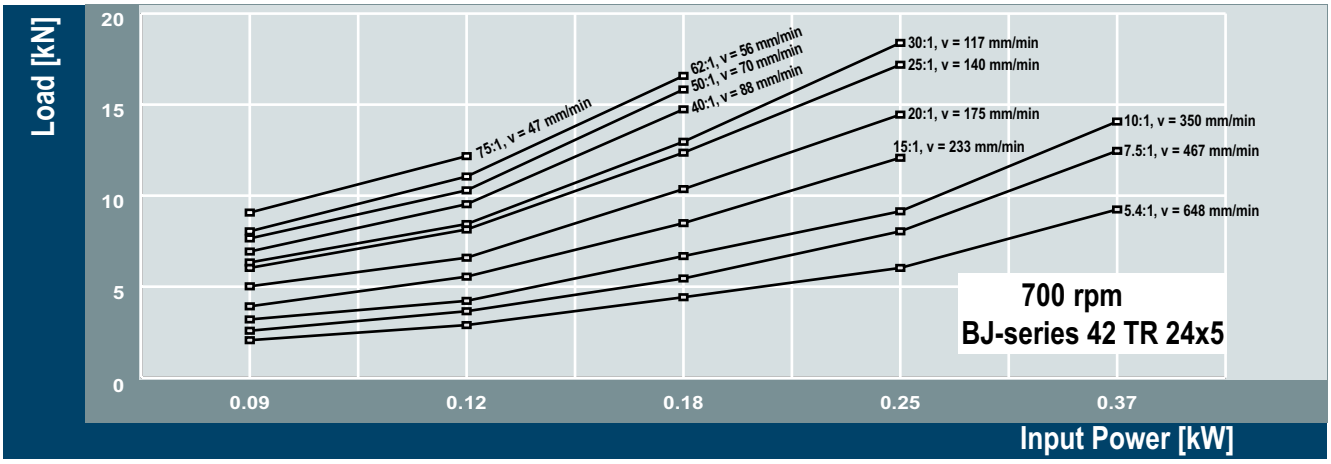
For exact values, see tables of effects on page 18 and 19. Other gear ratios on request.

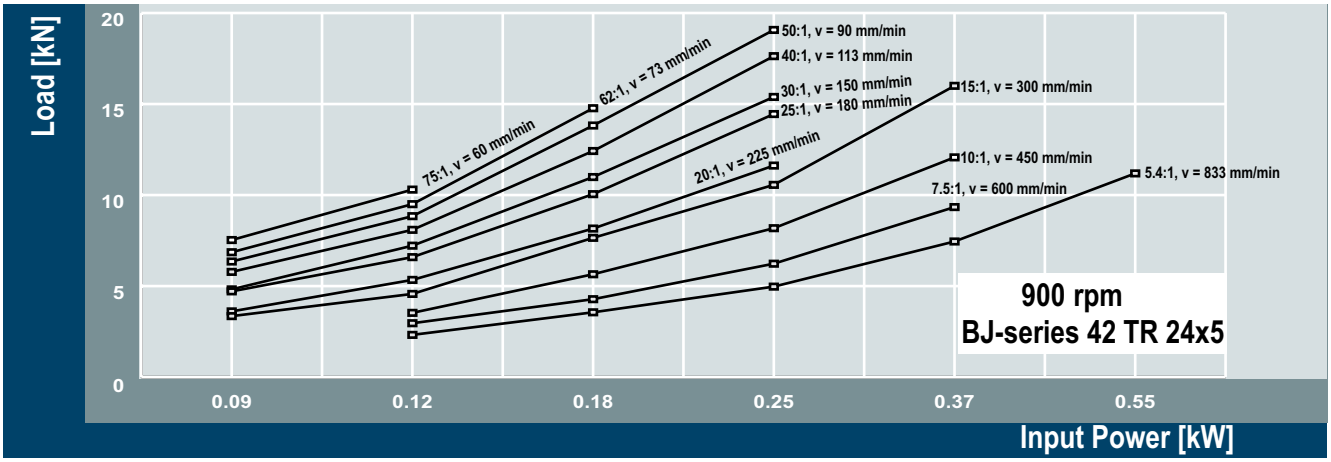
Dimensioning Gear Size and Gear Ratio

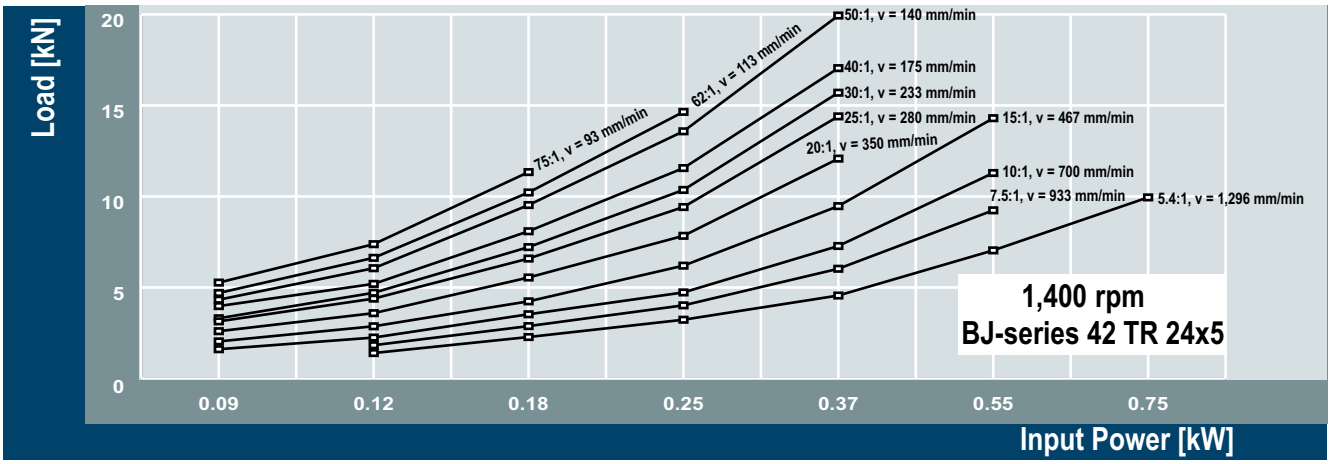
By using the graphs on subsequent pages, you can dimension gear size, gear ratio, linear speed and number of revolutions as well as motor according to your requirement.

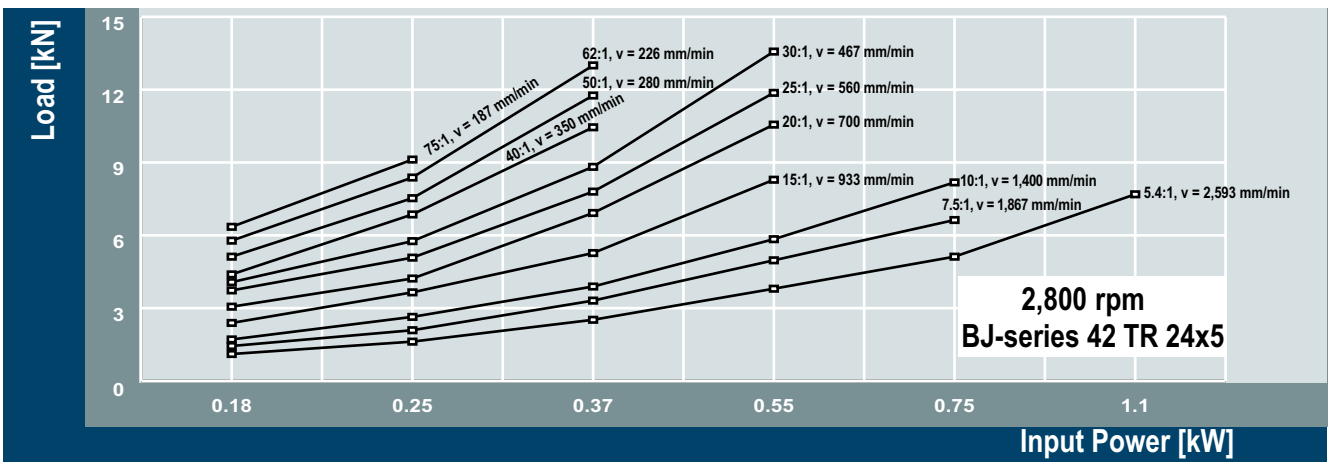
All data are based on clean and well lubricated spindles and use for only axial forces, as a spindle gear must not be affected by radial forces. Any uncontrolled stops must be prevented, i.e. running against mechanical stop or gear housing must not occur.

C Dimensioning BJ-series 42: Motor Speed 700, 900, 1,400 and 2,800 rpm

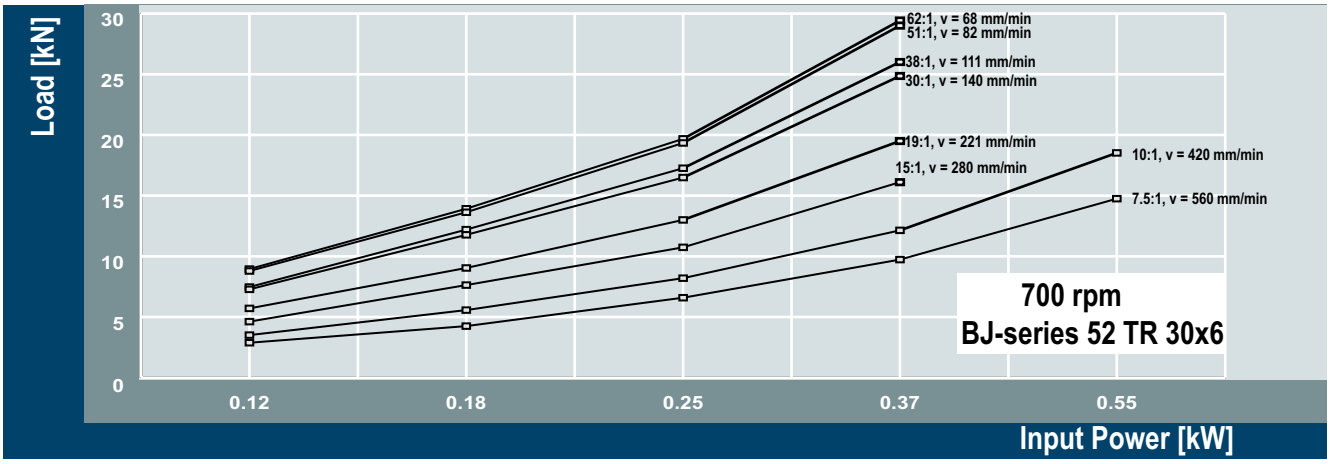


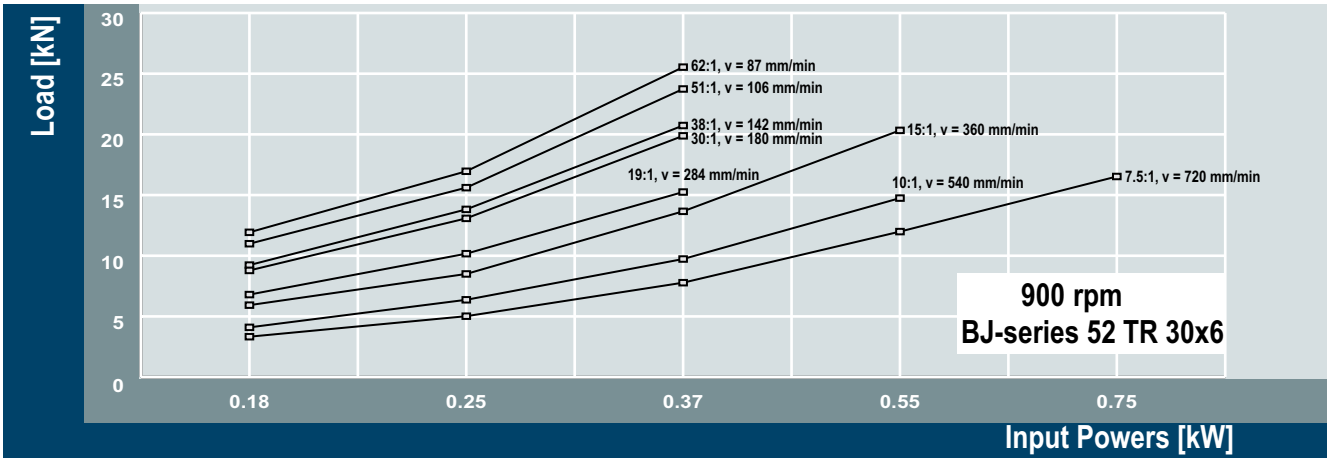


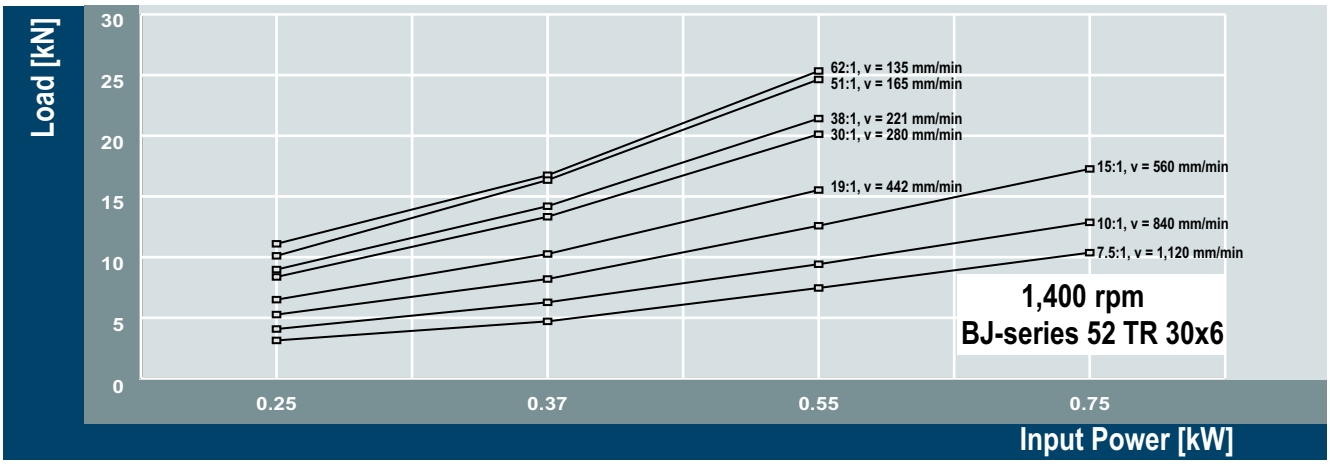


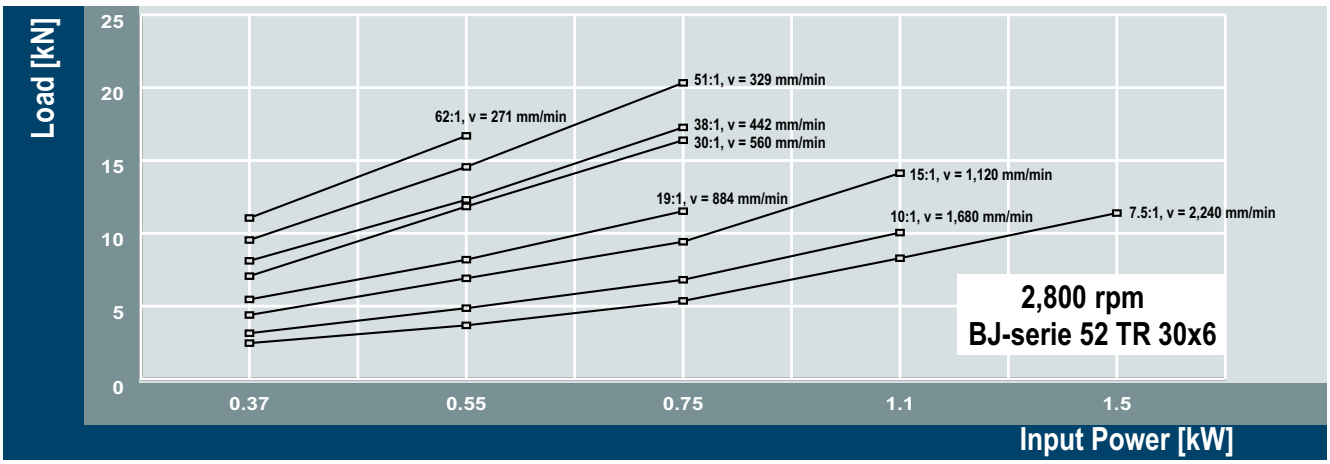


C Dimensioning BJ-series 52: Motor Speed 700, 900, 1,400 and 2,800 rpm

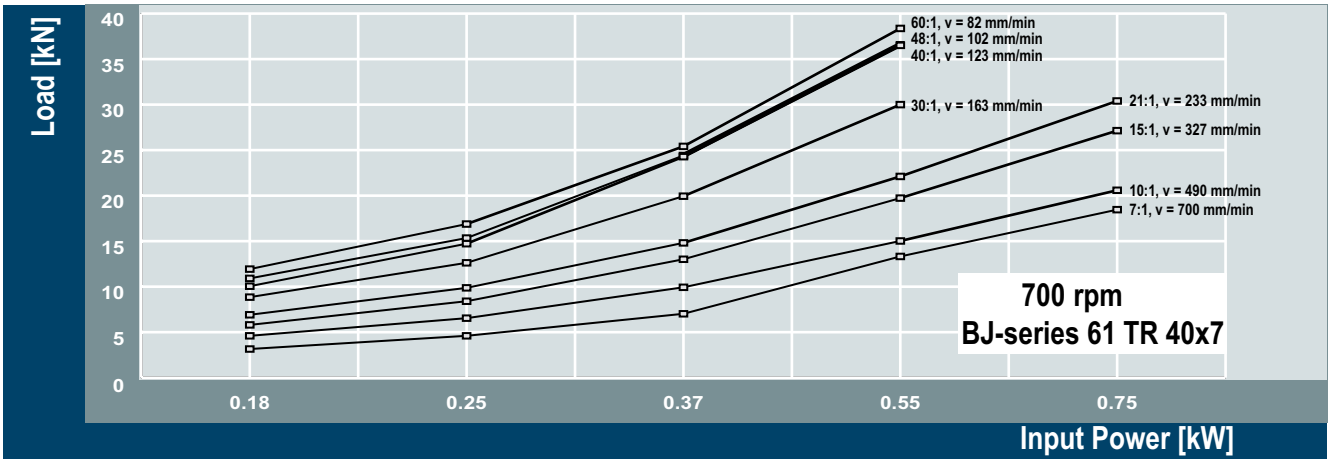


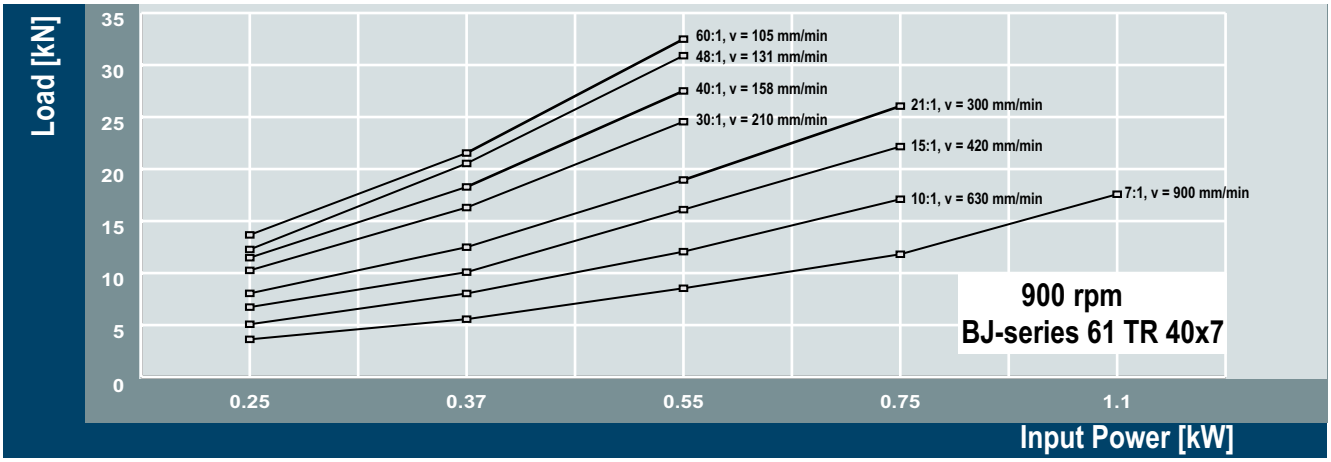


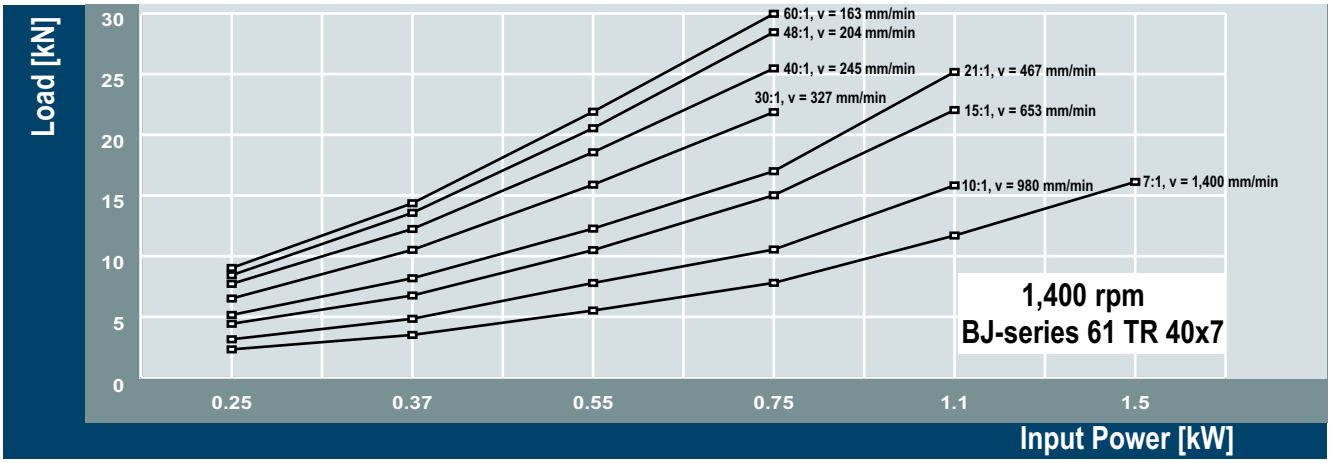


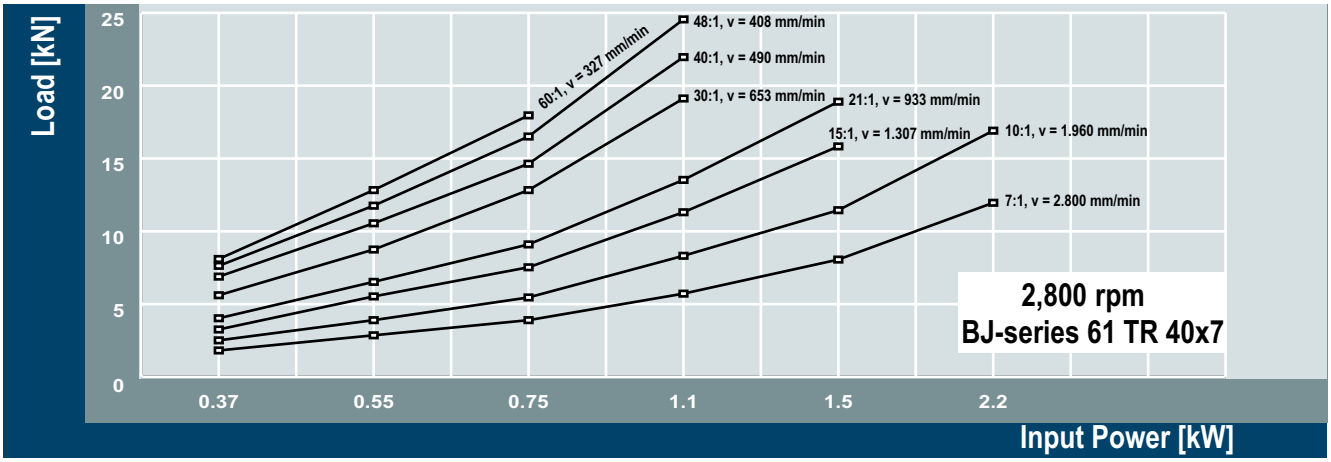


C Dimensioning BJ-series 61: Motor Speed 700, 900, 1,400 and 2,800 rpm

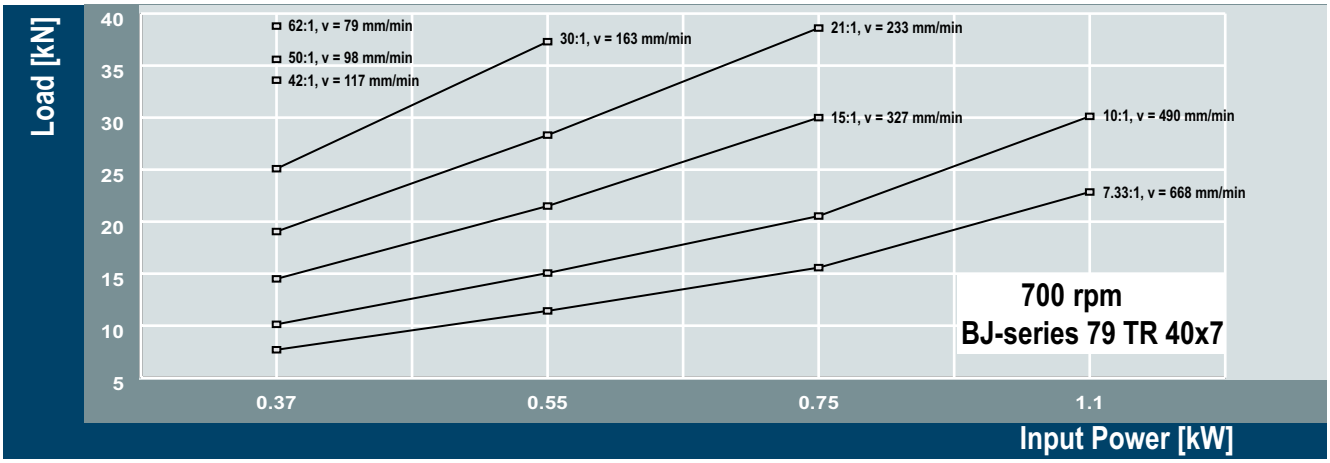


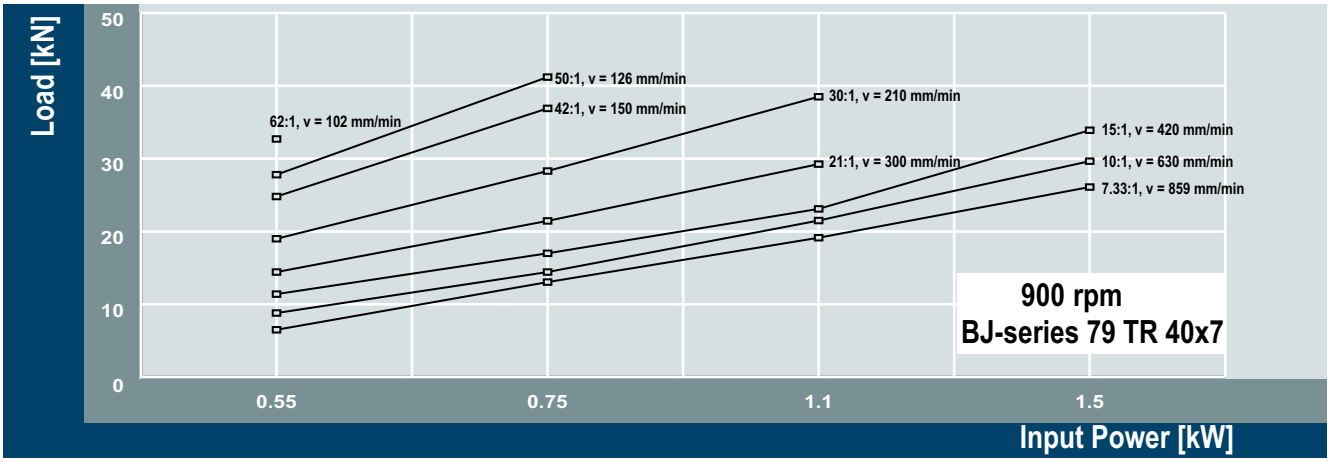


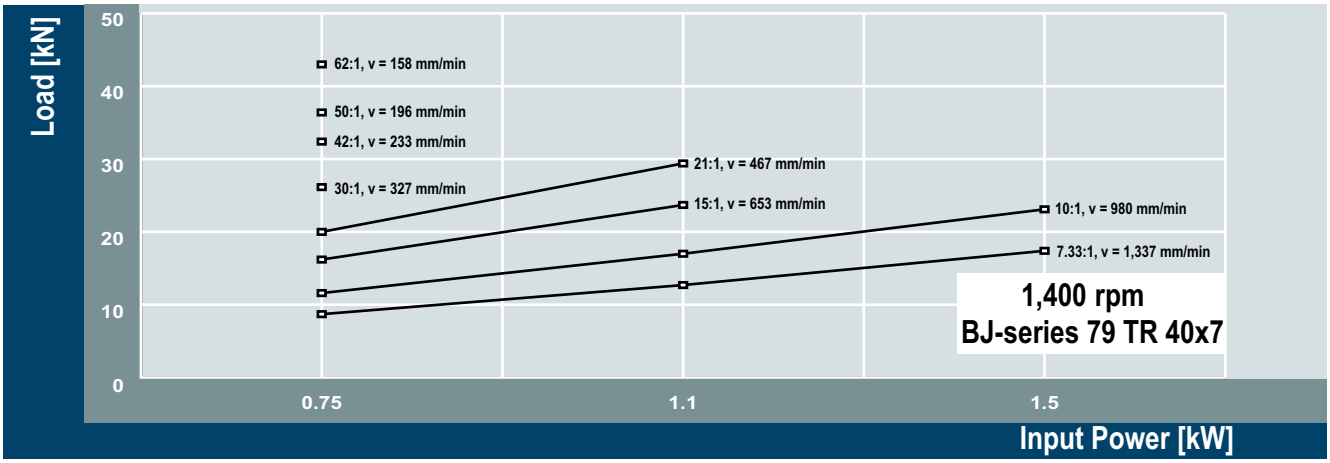


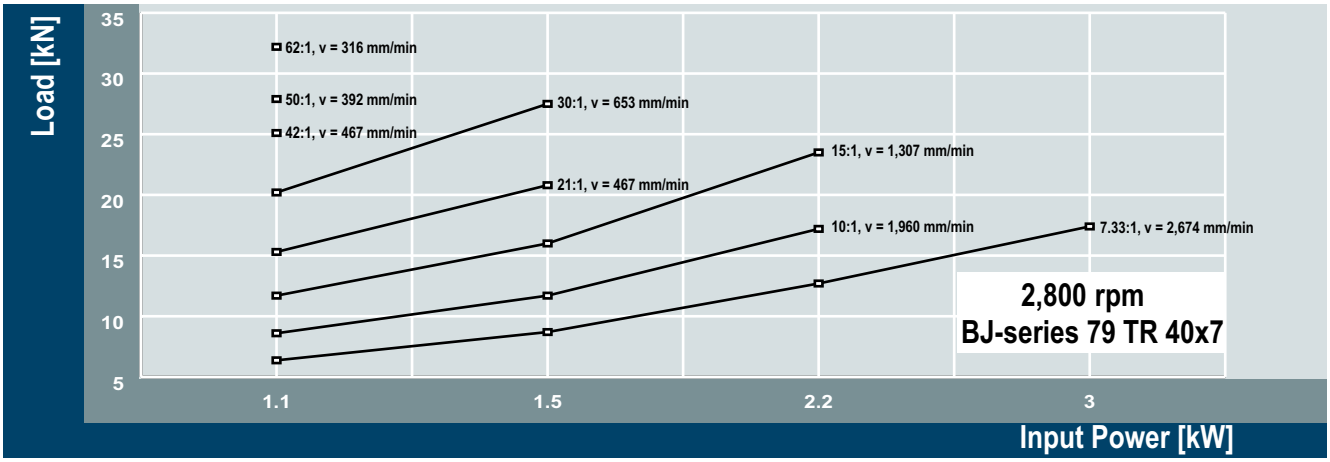


C Dimensioning BJ-series 79: Motor Speed 700, 900, 1,400 and 2,800 rpm

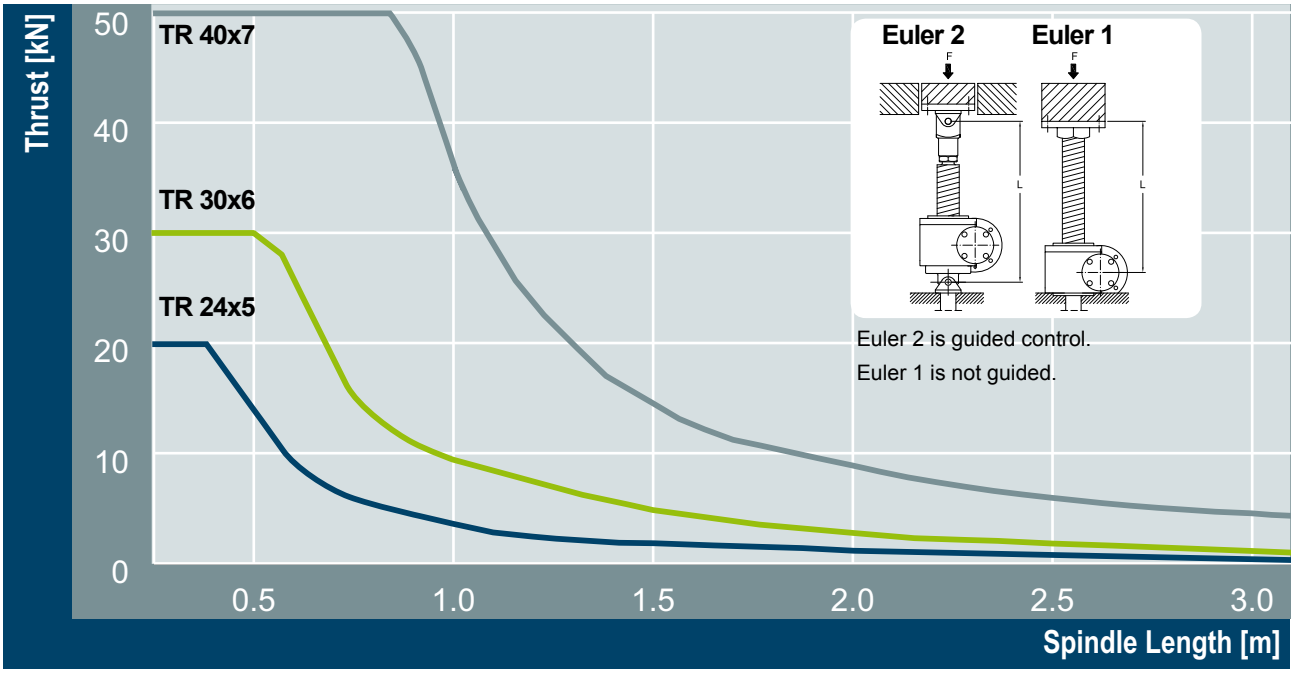








Maximum Permissible Axial Load of Trapezoidal Spindle (buckling load)



The diagram shows axial load according to Euler 2. Safety factor against breakage = 3. If using axial load according to Euler 1 the selected result (maximum thrust) must be divided with 4. Guideline values apply to spindles made both of steel and of stainless steel.

Mounting of Gear and Choice of Spindle

2	52	1	0	722	13	03	01	30	0	0

	Side Flange Right	Side Flange Left	Threaded Holes Right	Threaded Holes Left
Hollow Shaft with Trapezoidal Screw Thread for Through-going Spindle.				
Series 42, TR 24x5	1 1 612	1 1 712	1 0 612	1 0 712
Series 52, TR 30x6	1 1 622	1 1 722	1 0 622	1 0 722
Series 61, TR 40x7	1 1 632	1 1 732	1 0 632	1 0 732
Series 79, TR 40x7	1 1 632	1 1 732	1 0 632	1 0 732
Hollow Shaft for Rotating Spindle				
Series 42, ø18	1 1 472	1 1 572	1 0 472	1 0 572
Series 52, ø20	1 1 412	1 1 512	1 0 412	1 0 512
Series 61, ø25	1 1 432	1 1 532	1 0 432	1 0 532
Series 79, ø25	1 1 432	1 1 532	1 0 432	1 0 532

Customized Side Flange:

The side flange may for instance be manufactured to fit directly into the machine where it is to be used. By doing so, you can often both save space and money.

D-side (Drive side) and Worm Design

2	52	1	0	722	13	03	01	30	0	0

	Motor Flange and Hollow Worm at D-side	Free Worm Shaft at D-side	Coupling Housing and Free Worm shaft at D-side
ND-side closed			
	1X0X	3040	4X40
Free Shaft on ND-side			
	1X2X	3050	4X50

X To be replaced by digits No. 1 - 9 of below table.

Customized Solution:

The motor flange can be adapted to all motors. It is possible to mount couplings etc. between motor and gear. The worm may be manufactured in customized diameters and lengths.

This Table indicates Sizes of Motor Flanges B14, Coupling Housings and Hollow Worm Shafts according to IEC and IE2.

X to be replaced by		1	2	3	4	5	6	7	8	9
Series 42	Motor Flange	DCD 75	DCD 85	DCD 100	DCD 115	DCD 130			OMM	
	Coupling Housing		DCD 85	DCD 100						
	Hollow Worm	Ø 11	Ø 14						OMM	
Series 52	Motor Flange	DCD 75	DCD 85	DCD 100	DCD 115	DCD 130	DCD 165		OMM	
	Coupling Housing			DCD 100	DCD 115					
	Hollow Worm		Ø 14	Ø 19	Ø 24				OMM	OMR/OMP
Series 61	Motor Flange	DCD 75	DCD 85	DCD 100	DCD 115	DCD 130	DCD 165		OMM	OMR/OMP
	Coupling Housing			DCD 100	DCD 115					
	Hollow Worm		Ø 14	Ø 19	Ø 24				OMM	OMR/OMP
Series 79	Motor Flange			DCD 100	DCD 115	DCD 130	DCD 165	DCD 215		OMR/OMP
	Coupling Housing									
	Hollow Worm			Ø 19	Ø 24	Ø 28				OMR/OMP
Standard Motors		63	71	80	90	100/112	132 *			
Motor Power [kW] for 700 rpm			0.09 0.12	0.18 0.25	0.37 0.55	0.75 1.1 1.5	2.2 3.0			
Motor Power [kW] for 900 rpm		0.09 0.12	0.18 0.25	0.37 0.55	0.75 1.1	1.5 2.2	3.0 4.0 5.5			
Motor Power [kW] for 1,400 rpm		0.12 0.18	0.25 0.37	0.55 0.75	1.1 1.5	2.2 3.0 4.0	5.5 7.5			
Motor Power [kW] for 2,800 rpm		0.18 0.25	0.37 0.55	0.75 1.1	1.5 2.2	3.0 4.0	5.5 7.5			

DCD correspond to FT and FF motor flange sizes.

*) Only for mounting by way of coupling.

Choice of ND-side (None Drive)

2	52	1	0	722	13	03	01	30	0	0

01	**Closed End Cover,** together with Worm without Free Shaft on ND-side
30	**Open End Cover,** together with Worm with Free Shaft on ND-side
31	**Cover for Brake**
99	**Customer Specified,** for instance with Flange for Encoder

Choice of Oils / Lubricants

2	52	1	0	722	13	03	01	30	0	0

		Application	Viscosity ISO VG	Oil
0	**Fully synthetic gear oil, Standard**	Normal load and ambient temp. -25°C to +40°C	**220**	Klübersynth GH 6-220
1	**Fully synthetic gear oil**	Heavy load and ambient temp. -20°C to > +40°C	**460**	Klübersynth GH 6-460
2	**Fully synthetic gear oil**	Heavy load and ambient temp. -20°C to > +40°C	**680**	Klübersynth GH 6-680
3	**Liquid grease**	Normal load and ambient temp. -40°C to > +40°C	**1200**	Klübersynth GE 46-1200
4	**Special lubricating oil** for food and pharmaceutical industries	Normal load and ambient temp. -20°C to +40°C	**460**	Klüberoil 4 UH1-460 N

Indication of ambient temperature is only indicative.

Do not mix synthetic oils with mineral oils.

All data is based on synthetic oils.

Oil and Lubricants Quantities

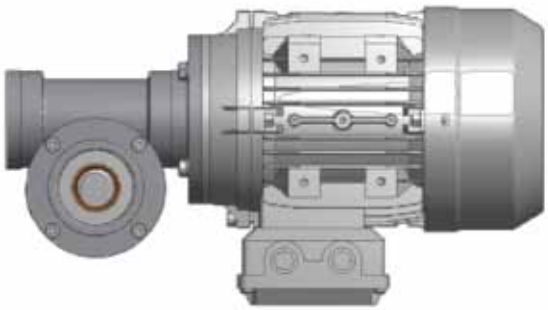
Series 42	Series 52	Series 61	Series 79
0.06 litres	0.18 litres	0.21 litres	0.5 litres

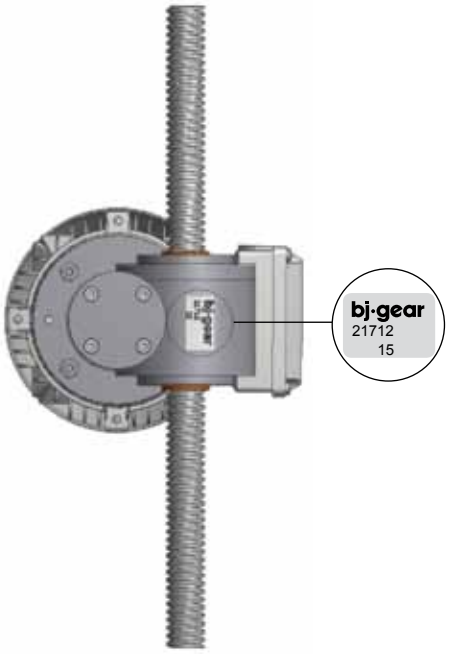
Choice of Finish

2	52	1	0	722	13	03	01	30	0	0

0	**Painted mat-black, Standard**	**RAL 9005**
1	**No treatment**	
2	**Primed**	
3	**Corrosion resistant surface treatment**	**Chromated**
4	**Customer specified**	

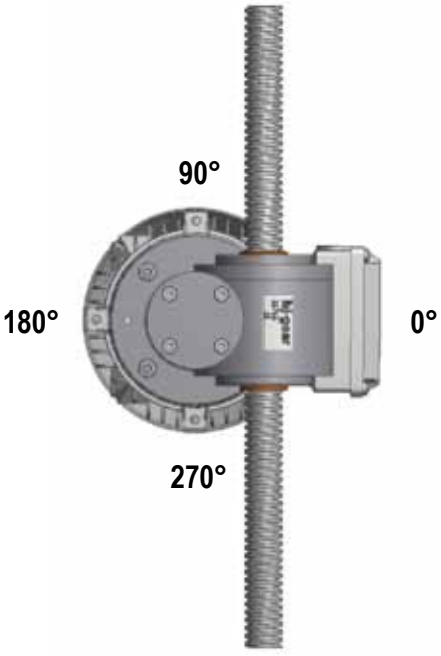
D Gear Number





On the ND-side, our gears are marked with an unique gear number consisting of serial number and gearing ratio ensuring that they can always be identified any time later on. By stating the gear number, we can always supply quickly a replacement gear, whether it is a standard gear, an adapted standard gear or a special gear.

E Position of Terminal Box



On ordering gear motors you can have the terminal box placed in a certain position.
Please inform us of 0°, 90°, 180° or 270°.

F Safety and Mounting

Mounting

Mounting/dismounting must only be made by qualified personnel in dry and clean premises. There must only be a maximum load by compression of the gear to avoid that the side flange and the gear housing move apart from each other. On mounting, please make sure that the fixing on to the spindle gear is perpendicular to the working direction of the spindle. Ensure a stable and even surface for the spindle gear. See picture A for an ideal way of mounting. All data are based on axial forces seeing that the spindle gear must not be affected by radial forces (bending strain). Uncontrolled stops must be avoided, i.e. running against mechanical stop or gear housing must not occur. The spindle must always be 100% in mesh with nut.

Safety

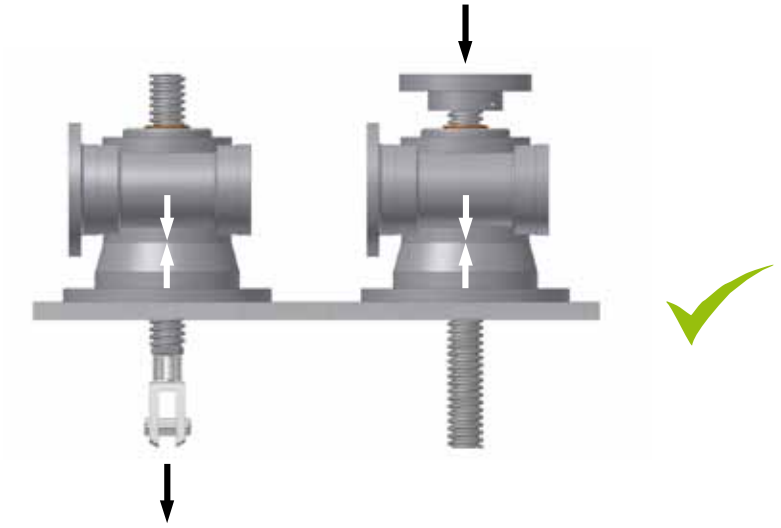
It is the responsibility of the machine designer to provide the necessary security – for instance with a safety nut etc. By improper use of the spindle gear, there may be a risk of personnal and/or material damage. Please contact BJ-Gear to learn more about safety regarding spindle gears.

Mounting/Dismounting of Motor

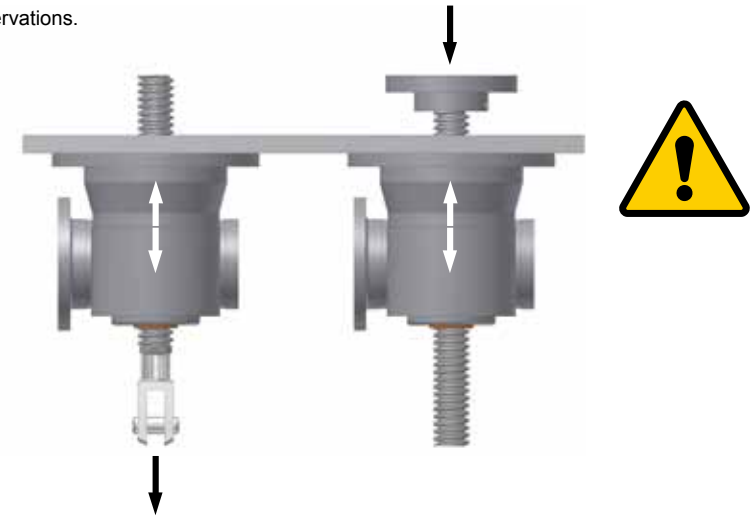
Mounting/dismounting of motor is to be made gently and with the right tools on a stable and even surface. On mounting make sure that the input shaft is lubricated with assemby paste. New gears from BJ-Gear are supplied lubricated. Insert the motor shaft into the input shaft of the spindle gear, rotate the motor to correct position and fasten with the accessory screws.
Never use hammer for fastening and dismounting. On dismounting, press the motor rearwards by means of 2 bolts which are to be screwed into the threaded holes of the motor flange and then the motor is pushed rearwards.

NOTE. All data are based on clean and well-lubricated spindles.

A) Ideal way of mounting:



B) Mounting subject to reservations.
Contact our specialists:



G Running-in and Maintenance

Running-in

The lifetime of the gear is increased by careful running-in. The first running time should not exceed 30 minutes and there must be time for cooling down before the next start. The load of the gear is gradually increased from half to full output torque.

Maintenance of Spindles

A certain time for running-in must be expected. The spindle should often be protected with for instance a bellow. See illustration at bottom of page. Due to the generation of heat between spindle and nut, the gears should not work continuously with heavy load.
It is important that the spindles and the nuts are kept clean and well-lubricated by using a good spindle grease – for instance Mobilith SCH 460. All data are based on clean and well-lubricated spindles. By daily operation the spindle should be checked weekly and lubricated as required. By fewer running hours, the spindle should be checked monthly.

Maintenance of the Gears

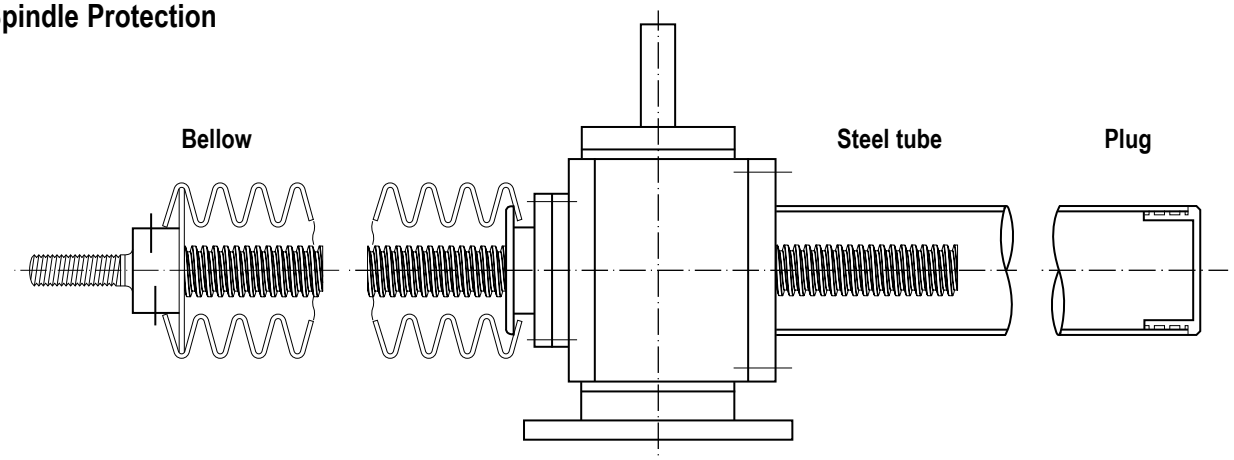
The gears are lifetime lubricated and require no special maintenance. However, for gears with heavy load, the oil should be changed every 5 year approx. Gears working in very warm environments may require oil change every year. See page 12 for oil quantity.
NOTE: All stated data are based on synthetic oils. Synthetic oils should not be mixed with mineral oils.

Spindle Specification, Rolled Acme Thread

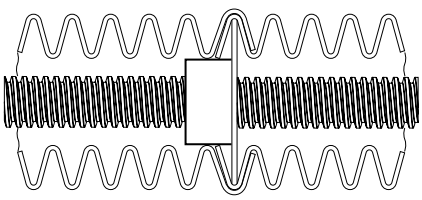
Type	Material	Material Condition	Tolerance Diameter	Tolerance Pitch	Tolerance Straightness
Precision	Steel: C45 Wst. 1.0503	Stress-free	e7	0.1/300 mm	0.2/300 mm
Precision	Stainless Steel: Wst. 1.4401	Stress-free	e7	0.2/300 mm	0.06/300 mm

Spindles are stocked in lengths of 3 metres. To be shortened and machined on request by customer.

Spindle Protection



Bellow extension



H Formulas

Formulas

On choosing spindle gear and motor, you need to know which load and approximate lifting speed to use. You may use the following example to find the appropriate spindle gear and motor. All efficiencies (η) are to be inserted in decimal. In case of any questions, please contact our specialists.

P_{start} = Starting power drive motor [kW]
F_{run} = Total load in [kN]
V_{run} = Lifting speed (linear speed) in [mm/min]
η_{start} = Starting efficiency [%], see table page 18-19

Starting Power

The starting power of the drive motor is the starting power required for start-up. To avoid overload, you must be sure that the motor is dimensioned to handle the starting power. This applies especially when using other driving units than three-phased AC motors e.g. air motors and hydraulic motors etc. Then the power has to be recalculated. A 3-phased AC motor has normally a starting power which is 2-2,5 times normal output torque and for that reason it should be able to overcome the starting efficiency without any problems.
Calculation of starting power:

$$P_{start} = \frac{F * V}{\eta_{start} * 60 * 1000} \text{ [kW]}$$

Example

A load of 9 kN is to be lifted at a speed of approx. 300 mm/min. The solution is either to be found via the curves on page 6,7,8 and 9 or in the tables on page 18 and 19. In this example the table on page 18 is used.
A solution with series 42 - TR 24x5 with a 1,400 rpm motor 0.25 kW and gear ratio 25:1 is used. It can lift/pull 9.4 kN and at a lifting speed of 280 mm/min. Starting efficiency is 12%.

Example from table on page 18.

Motor		Series 42 Maximum Pull-/ Thrust Load with Spindle TR 24x5 [kN]											
		ηstart [%]	19	18	17	15	13	12	10	8	7	6	5
		Gear Ratio	5.4:1	7.5:1	10:1	15:1	20:1	25:1	30:1	40:1	50:1	62:1	75:1
[rpm]	[kW]	v [mm/min]	1,296	933	700	467	350	280	233	175	140	113	93
1,400	0.09				1.6	2.0	2.6	3.1	3.3	4.0	4.3	4.7	5.3
	0.12		1.4	1.8	2.3	2.9	3.6	4.4	4.7	5.2	6.1	6.6	7.4
	0.18		2.3	2.9	3.5	4.2	5.6	6.6	7.2	8.1	9.5	10.2	11.3
	0.25		3.2	4.0	4.7	6.2	7.8	9.4	10.4	11.6	13.6	14.6	
	0.37		4.6	6.0	7.3	9.5	12.0	14.4	15.7	17.1	19.9		
	0.55 *		7.0	9.2	11.3	14.3							
	0.75 *		9.9										

The table values are operating figures. In order to check whether the motor is strong enough to cope with the starting power by lifting/ pulling, the following formula for starting power may be used:

$$P_{start} = \frac{9 * 300}{0.12 * 60 * 1000} \qquad P_{start} = 0.375 \text{ [kW]}$$

In this case there are no problems as an ordinary standard-dimensioned motor in a short time (starting torque) can perform up to approx. 2-2.5 times its nominal torque. For extra safety you can choose a larger motor for instance 0.37 kW.

H Formulas

ED Factor

All data are based on ED factor = 1.0 which means that the duty factor of the spindle gears should not be more than 20% per hour and maximum 40% per 10 minutes. If the ED is more than 50%, it should be considered to use ball screw spindle instead.
For other ED factors choose the values from this tabel:

ED % per hour	20	30	40	50	60	70	80	90	100
ED Factor Trapezoidal Spindle	1.0	0.7	0.6	0.5	-	-	-	-	-

ED Example

If a higher ED factor than 20% is mandatory a new calculation must be made. Example from previous page is used where a load of 9 kN is to be lifted.
F_{run} is the total load in kN.
F_{max} = Maximum pull-/ thrust for the choosen gear ratio in the tables.
ED 30% is required = factor 0.7

Following formula is used:

F_{run} = F_{max} * ED factor
10 = 14.4 * 0.7 [kN]

Maximum permissible load on ED 30% is 10 kN.
In this case the actual force is 9.0 kN which is less than the permissible load 10 kN, so there is no problems.

Motor		Series 42 Maximum Pull-/ Thrust Load with Spindle TR 24x5 [kN]					
		ηstart [%]	17	15	13	12	10
		Gear Ratio	10:1	15:1	20:1	25:1	30:1
[rpm]	[kW]	v [mm/min]	700	467	350	280	233
1,400	0.09		1.6	2.0	2.6	3.1	3.3
	0.12		2.3	2.9	3.6	4.4	4.7
	0.18		3.5	4.2	5.6	6.6	7.2
	0.25		4.7	6.2	7.8	9.4	10.4
	0.37		7.3	9.5	12.0	14.4	15.7
	0.55 *		11.3	14.3			

Static Load

Series	42	52	61	79
Spindle Size	TR 24x5	TR 30x6	TR 40x7	TR 40x7
Maximum Static Load [kN]	20	52	55	58

Safety factor against breakage = 2.

Operating Efficiency

Operating Efficiency %																					
[rpm]	Gear Series	Gear Ratio																			
		5.4:1	7:1	7.3:1	7.5:1	10:1	15:1	19:1	20:1	21:1	25:1	30:1	38:1	40:1	42:1	48:1	50:1	51:1	60:1	62:1	75:1
700	42	26	-	-	24	21	18	-	17	-	16	14	-	12	-	-	10	-	-	9	8
	52	-	-	-	24	23	20	20	-	-	-	16	13	-	-	-	-	11	-	9	-
	61	-	24	-	-	22	19	-	-	15	-	14	-	13	-	11	-	-	9	-	-
	79	-	-	24	-	23	18	-	-	17	-	12	-	-	9	-	8	-	-	5	-
900	42	28	-	-	25	24	20	-	17	-	17	15	13	-	-	-	-	11	-	10	8
	52	-	-	-	25	24	22	19	-	-	-	16	13	-	-	-	-	11	-	10	-
	61	-	23	-	-	23	20	-	-	17	-	15	-	13	-	12	-	-	10	-	-
	79	-	-	24	-	20	15	-	-	14	-	13	-	-	12	-	11	-	-	11	-
1,400	42	28	-	-	25	23	19	-	18	-	17	16	-	13	-	-	12	-	-	10	9
	52	-	-	-	25	24	22	21	-	-	-	17	15	-	-	-	-	13	-	11	-
	61	-	24	-	-	23	21	-	-	17	-	16	-	14	-	13	-	-	11	-	-
	79	-	-	26	-	26	24	-	-	21	-	19	-	-	17	-	16	-	-	15	-
2,800	42	29	-	-	27	25	23	-	21	-	20	18	-	16	-	-	14	-	-	13	11
	52	-	-	-	27	25	24	23	-	-	-	20	17	-	-	-	-	15	-	14	-
	61	-	25	-	-	24	22	-	-	19	-	18	-	16	-	15	-	-	13	-	-
	79	-	-	26	-	26	24	-	-	22	-	20	-	-	18	-	17	-	-	15	-

H Table of Effects

Motor		Series 42 Maximum Pull-/ Thrust Load with Spindle TR 24x5 [kN]											
		η start [%]	19	18	17	15	13	12	10	8	7	6	5
		Gear Ratio	5.4:1	7.5:1	10:1	15:1	20:1	25:1	30:1	40:1	50:1	62:1	75:1
[rpm]	[kW]	v [mm/min]	648	467	350	233	175	140	117	88	70	56	47
700	0.09		2.0	2.6	3.2	3.9	5.0	6.0	6.3	6.9	7.6	8.0	9.0
	0.12		2.8	3.7	4.2	5.6	6.6	8.1	8.4	9.5	10.3	11.0	12.1
	0.18 *		4.4	5.5	6.7	8.5	10.4	12.4	12.9	14.7	15.8	16.5	
	0.25 *		6.0	8.0	9.1	12.1	14.5	17.2	18.3				
	0.37 *		9.2	12.5	14.1								
[rpm]	[kW]	v [mm/min]	833	600	450	300	225	180	150	113	90	73	60
900	0.09					3.4	3.6	4.7	4.8	5.7	6.4	6.8	7.5
	0.12		2.3	2.9	3.5	4.6	5.3	6.6	7.2	8.1	8.8	9.5	10.3
	0.18		3.6	4.3	5.7	7.6	8.2	10.1	10.9	12.4	13.8	14.7	
	0.25		4.9	6.2	8.2	10.6	11.6	14.4	15.4	17.6	19.0		
	0.37 *		7.5	9.3	12.1	16.0							
	0.55 *		11.2										
[rpm]	[kW]	v [mm/min]	1,296	933	700	467	350	280	233	175	140	113	93
1,400	0.09				1.6	2.0	2.6	3.1	3.3	4.0	4.3	4.7	5.3
	0.12		1.4	1.8	2.3	2.9	3.6	4.4	4.7	5.2	6.1	6.6	7.4
	0.18		2.3	2.9	3.5	4.2	5.6	6.6	7.2	8.1	9.5	10.2	11.3
	0.25		3.2	4.0	4.7	6.2	7.8	9.4	10.4	11.6	13.6	14.6	
	0.37		4.6	6.0	7.3	9.5	12.0	14.1	15.7	17.1	19.9		
	0.55 *		7.0	9.2	11.3	14.3							
	0.75 *		9.9										
[rpm]	[kW]	v [mm/min]	2,593	1,867	1,400	933	700	560	467	350	280	226	187
2,800	0.18		1.1	1.4	1.7	2.4	3.1	3.7	4.1	4.4	5.1	5.8	6.4
	0.25		1.6	2.1	2.6	3.7	4.2	5.1	5.8	6.9	7.5	8.4	9.1
	0.37		2.5	3.3	3.9	5.3	6.9	7.8	8.8	10.5	11.8	13.0	
	0.55		3.8	4.9	5.8	8.3	10.5	11.8	13.6				
	0.75 *		5.1	6.6	8.2								
	1.10 *		7.7										

* Not IEC-standard.

Motor		Series 52 Maximum Pull-/ Thrust Load with Spindle TR 30x6 [kN]							
		η start [%]	18	17	16	15	12	10	9	8
		Gear Ratio	7.5:1	10:1	15:1	19:1	30:1	38:1	51:1	62:1
[rpm]	[kW]	v [mm/min]	560	420	280	221	140	111	82	68
700	0.12		2.8	3.5	4.6	5.7	7.2	7.4	8.7	8.9
	0.18		4.2	5.5	7.6	9.0	11.7	12.2	13.6	13.9
	0.25		6.5	8.2	10.7	13.0	16.4	17.2	19.3	19.6
	0.37		9.7	12.1	16.1	19.5	24.8	26.0	29.0	29.4
	0.55		14.7	18.5						
[rpm]	[kW]	v [mm/min]	720	540	360	284	180	142	106	87
900	0.18		3.3	4.1	5.9	6.8	8.7	9.2	10.9	11.9
	0.25		5.0	6.3	8.5	10.1	13.0	13.8	15.6	16.9
	0.37		7.7	9.7	13.6	15.2	19.8	20.7	23.7	25.5
	0.55		12.0	14.7	20.3					
	0.75		16.5							
[rpm]	[kW]	v [mm/min]	1,120	840	560	442	280	221	165	135
1,400	0.25		3.1	4.0	5.2	6.5	8.3	8.9	10.1	11.1
	0.37		4.7	6.2	8.2	10.2	13.3	14.2	16.3	16.7
	0.55		7.4	9.4	12.5	15.5	20.1	21.4	24.6	25.3
	0.75		10.3	12.8	17.2					
[rpm]	[kW]	v [mm/min]	2,240	1,680	1,120	884	560	442	329	271
2,800	0.37		2.4	3.1	4.3	5.4	7.0	8.1	9.5	11.0
	0.55		3.6	4.8	6.9	8.1	11.8	12.3	14.5	16.6
	0.75		5.3	6.8	9.4	11.5	16.3	17.2	20.3	
	1.10		8.2	10.0	14.1					
	1.50		11.3							

The values apply to well run in and conditioned gears as well as clean and well-lubricated spindles. η_{Start} = starting efficiency in %.

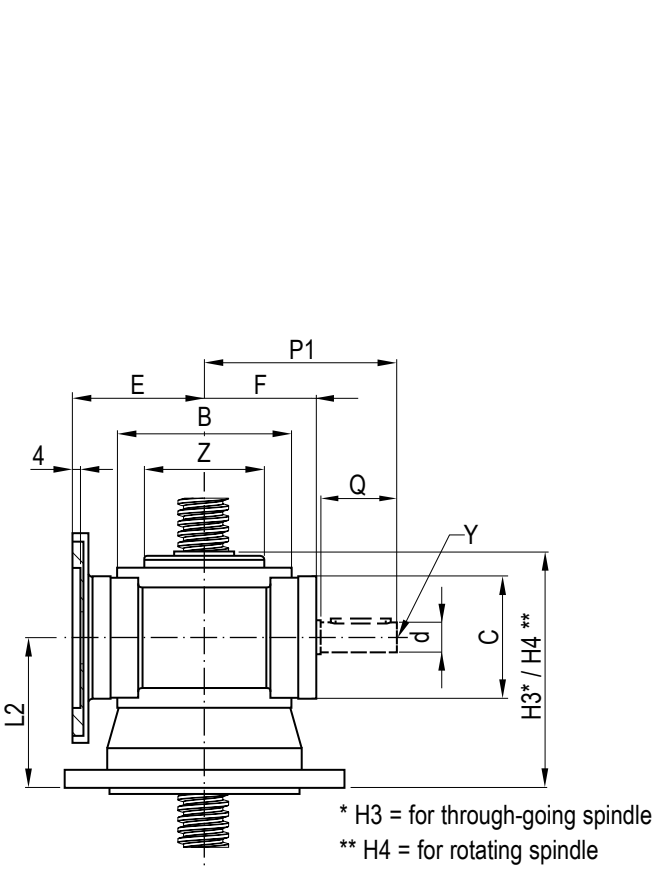
H Table of Effects

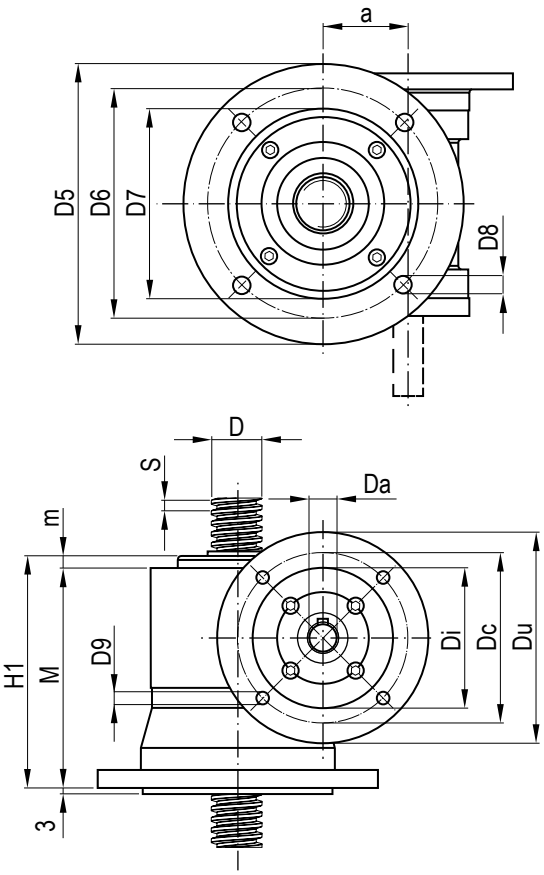
Motor		Series 61 Maximum Pull-/ Thrust Load with Spindle TR 40x7 [kN]								
		ηstart [%]	15	14	12	10	8	7	6	5
		Gear Ratio	7:1	10:1	15:1	21:1	30:1	40:1	48:1	60:1
[rpm]	[kW]	v [mm/min]	700	490	327	233	163	123	102	82
700	0.18		3.1	4.6	5.8	6.9	8.8	10.0	10.9	11.9
	0.25		4.6	6.5	8.4	9.8	12.6	14.7	15.3	16.8
	0.37		7.0	9.9	13.0	14.8	19.9	24.2	24.4	25.4
	0.55		13.3	15.0	19.7	22.1	30.0	36.5	36.6	38.3
	0.75		18.4	20.5	27.1	30.4				
[rpm]	[kW]	v [mm/min]	900	630	420	300	210	158	131	105
900	0.25		3.6	5.0	6.7	8.0	10.2	11.4	12.2	13.6
	0.37		5.5	8.0	10.0	12.4	16.3	18.2	20.5	21.5
	0.55		8.5	12.0	16.1	18.9	24.5	27.5	30.9	32.4
	0.75		11.8	17.1	22.1	26.0				
	1.10		17.5							
[rpm]	[kW]	v [mm/min]	1,400	980	653	467	327	245	204	163
1,400	0.25		2.3	3.1	4.4	5.1	6.5	7.7	8.4	9.0
	0.37		3.5	4.8	6.7	8.1	10.5	12.2	13.5	14.3
	0.55		5.5	7.7	10.5	12.2	15.8	18.5	20.5	21.9
	0.75		7.8	10.5	15.0	17.0	21.8	25.4	28.4	29.9
	1.10		11.7	15.8	22.0	25.1				
	1.50		16.1							
[rpm]	[kW]	v [mm/min]	2,800	1,960	1,307	933	653	490	408	327
2,800	0.37		1.8	2.5	3.2	4.0	5.6	6.8	7.6	8.1
	0.55		2.8	3.9	5.5	6.5	8.7	10.5	11.7	12.8
	0.75		3.9	5.4	7.5	9.1	12.8	14.6	16.5	17.9
	1.10		5.7	8.3	11.3	13.5	19.1	21.9	24.5	
	1.50		8.0	11.4	15.8	18.9				
	2.20		11.9	16.9						

Motor		Series 79 Maximum Pull-/ Thrust Load with Spindle TR 40x7 [kN]								
		ηstart [%]	14	13	11	10	8	7	6	5
		Gear Ratio	7.3:1	10:1	15:1	21:1	30:1	42:1	50:1	62:1
[rpm]	[kW]	v [mm/min]	668	490	327	233	163	117	98	79
700	0.37		7.6	10.1	14.5	19.0	25.0	33.6	35.6	38.8
	0.55		11.4	15.0	21.5	28.3	37.3			
	0.75		15.5	20.5	30.0	38.6				
	1.10		22.8	30.1						
[rpm]	[kW]	v [mm/min]	859	630	420	300	210	150	126	102
900	0.55		6.5	8.8	11.4	14.4	19.0	24.8	27.8	32.7
	0.75		13.0	14.4	17.0	21.4	28.3	36.9	41.2	
	1.10		19.1	21.5	23.1	29.2	38.5			
	1.50		26.1	29.6	33.9					
[rpm]	[kW]	v [mm/min]	1,337	980	653	467	327	233	196	158
1,400	0.75		8.7	11.6	16.2	20.0	26.1	32.4	36.4	43.0
	1.10		12.7	17.0	23.7	29.4				
	1.50		17.4	23.1						
[rpm]	[kW]	v [mm/min]	2,674	1,960	1,307	933	653	467	392	316
2,800	1.10		6.3	8.6	11.7	15.3	20.2	25.1	27.9	32.2
	1.50		8.7	11.7	16.0	20.8	27.5			
	2.20		12.7	17.2	23.5					
	3.00		17.4							

The values apply to well run in and conditioned gears as well as clean and well-lubricated spindles. η_{Start} = starting efficiency in %.

I Dimensional Drawings High Shape





Dimension Tables

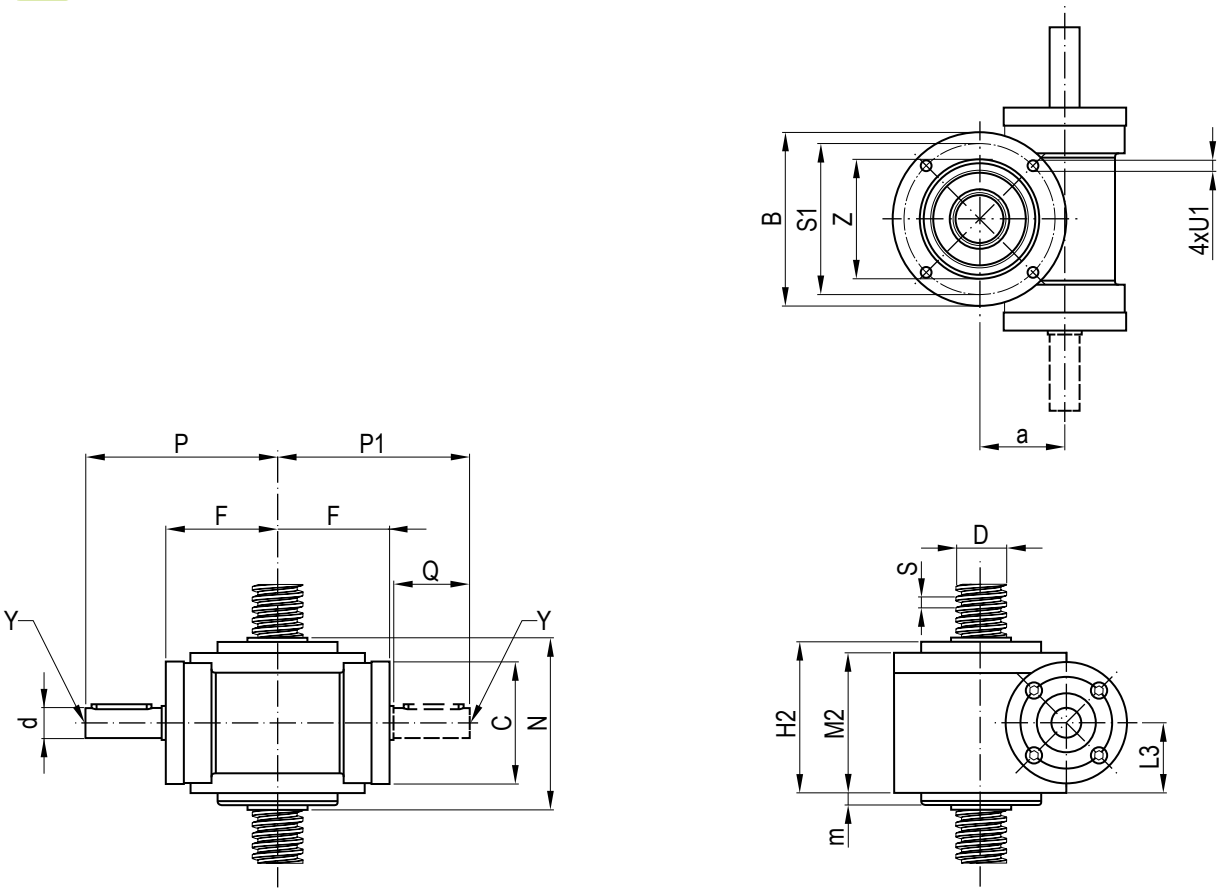
Gear Series	Spindle		Main Dimensions											Worm Shaft				Attachment				Weight
	D	S	a	B	C	F	H1	H3	H4	L2	M	m	Z^{h7}	P1	d^{k6}	Q	Y	D5	D6	$D7^{h7}$	D8	approx. kg
BJ-42	24	5	42.5	87	60	56	116	118	118	75	110	6	60	96	15	38	M6x14	140	115	95	9	5.4
BJ-52	30	6	52.5	110	72	68	126	128	128	80	120	6	65	110	19	40	M8x15	140	115	95	9	9
BJ-61	40	7	61.0	126	72	82	132	140	134	85	127	5	90	123	19	40	M8x15	200	165	130	11	12
BJ-79	40	7	79.0	164	82	97	153	157	155	100	146	7	105	159	24	60	M8x15	200	165	130	11	23

Gear Series	Frame Size IEC 71 - B14						Frame Size IEC 80 - B14						Frame Size IEC 90 - B14					
	Da^{G7}	Dc	Di^{F6}	Du	D9	E	Da^{G7}	Dc	Di^{F6}	Du	D9	E	Da^{G7}	Dc	Di^{F6}	Du	D9	E
BJ-42	14	85	70	105	7	66												
BJ-52	14	85	70	105	7	82	19	100	80	120	7	82	24	115	95	140	9	92
BJ-61	14	85	70	105	7	91	19	100	80	120	7	91	24	115	95	140	9	101
BJ-79							19	100	80	120	7	118	24	115	95	140	9	118

Gear Series	Frame Size IEC 100 and IEC 112 - B14					
	Da^{G7}	Dc	Di^{F6}	Du	D9	E
BJ-79	28	130	110	160	9	126

Key and keyway according to DIN 6885.

J Dimensional Drawings Low Shape



Dimension Table

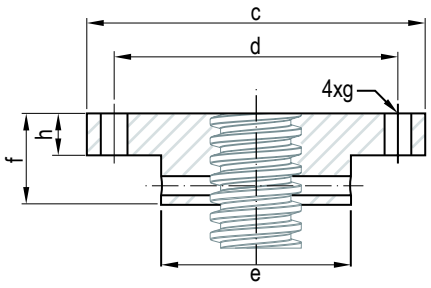
Gear Series	Spindle		Main Dimensions								Worm Shaft					Attachment				Weight
	D	S	a	C	F	H2	L3	M2	m	N	P	P1	d^{k6}	Q	Y	Z	S1	B	U1	approx. kg
BJ-42	24	5	42.5	61	56	76	35	70	6	86	96	96	15	38	M6x14	60	76	87	M6x9	4.5
BJ-52	30	6	52.5	72	68	86	40	80	6	96	110	110	19	40	M8x15	65	95	110	M6x9	8
BJ-61	40	7	61.0	72	82	89	42	83	5	98	120	123	19	40	M8x15	90	108	126	M8x12	10
BJ-79	40	7	79.0	82	97	99	46	92	7	110	159	159	24	60	M8x15	105	125	164	M10x12	18

Key and keyway according to DIN 6885.

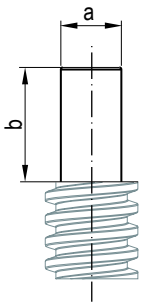
Weight of Spindles

Spindle	Weight in kg per meter	
	Steel	Stainless Steel
TR 24x5	2.7	2.7
TR 30x6	4.4	4.4
TR 40x7	8.0	8.0

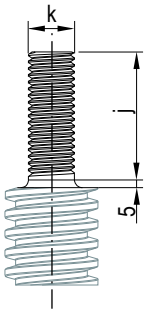
K Dimensional Drawings for Spindle Connections



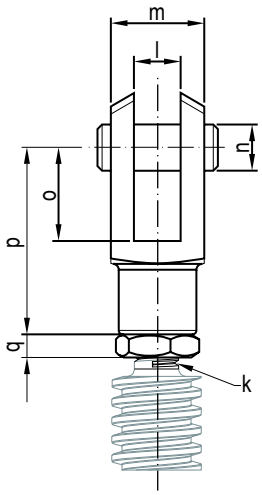
Type 2 **)



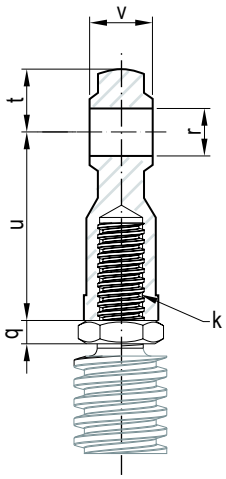
Type 1



Type 3



Type 4



Type 5

Dimension Tables for Spindle Connections

Gear Series	Type 1		Type 2 **)						Type 3		Type 4			
	a^{k6}	b	c	d	e	f	g	h	j	k	k	l	m	n
BJ-42	16	30	89	75	50	24	7	11	34	M16	M16	16	32	16
BJ-52	18	30	105	85	55	30	7	11	43	M20x1.5	M20x1.5	20	40	20
BJ-61	24	40	118	100	65	40	9	16	50	M24x2	M24x2	25	50	25
BJ-79	24	40	118	100	65	40	9	16	65	M30x2	M30x2	30	60	30

Gear Series	Type 4			Type 5					
	o	P	q	k	q	r^{H6}	t	u	v
BJ-42	32	64	8	M16	8	16	21	64	21
BJ-52	40	80	10	M20X1.5	10	20	25	77	25
BJ-61	50	100	12	M24X2	12	25	31	94	31
BJ-79	60	120	15	M30X2	15	30	36	110	37

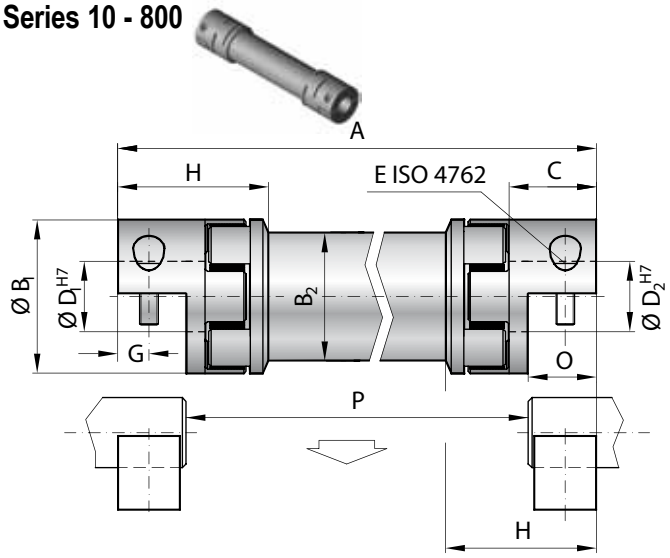
Maximum Load Connections [kN]

Gear Series	Type 1	Type 2 **)	Type 3	Type 4	Type 5
	Pull/Thrust	Pull/Thrust	Pull/Thrust	Pull/Thrust	Pull/Thrust
BJ-42	*)	20	18.3	18.3	16
BJ-52	*)	30	29	29	23
BJ-61	*)	39	31	31	26
BJ-79	*)	43	48.4	48.4	48.4

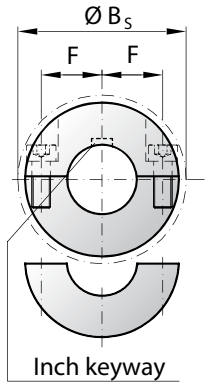
* Machined end for support bearing. ** Standard in stainless steel.

L Line Shafts (Connecting Shafts)

Line shafts (connecting shafts) are used by synchronous operation of the spindle gears.
Series 10 - 800



The total length of the axis is defined by the distance P + 2 x 0



Inch keyway
or DIN 6885
Available
on request

Properties:
- Lateral mounting due to split hubs
- Spans distances of up to 4 m
- Low moment of inertia
- Vibration damping
- Press fit designs
- Backlash free Line Shaft

Material:
Clamping hub: High strength aluminum.
Elastomer insert: Precision molded wear resistant, and thermally stable polymer.
Intermediate tubes: Precision machined aluminum tube.

Design:
Two split coupling hubs are concentrically machined with concave driving jaws. Both coupling bodies are rigidly mounted to tubes with high concentricity. While loosening the tube clamping, a length variation is possible within the given range. Elastomer inserts are available in type A or B.

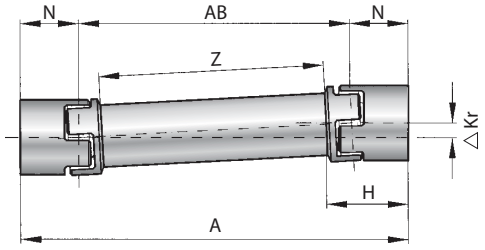
Speed:
To control the critical resonant speed please advise the application speed when ordering or inquiring about EZV Line Shafts.

Tolerance:
On the hub/shaft connection 0.01 to 0.05 mm.

Model EZ2 Serie	Type	Rated Torque [Nm]	Max Torque [Nm]	Overall Length [mm]	Outside diameter of clamping hub [mm]	Outside diameter tube [mm]	Outside diameter with screw head [mm]	Fit Lenght [mm]	Inside-diameter range H7 [mm]	Claming screw [ISO 4762]		Distance between centers [mm]	Distance [mm]	Lenght of the couplings [mm]	Moment of inertia per coupling [10⁻³ kgm²]	Inertia of tube per meter [10⁻³ kgm²]	Combined dynamical torsional stiffness of the inserts [Nm/rad]	Torsional stiffness of tube per meter [Nm/rad]	Distance between centers [mm]	Mounting Lenght [mm]
		T_{KN}	T_{Kmax}	A	B1	B2	Bs	C	D_{H7}	E		F	G/G1	H	J_1/J_2	J_3	C_{Tdyn}^{E}	C_T^{ZWR}	N	O
20	A	17	34	130 - 4,000	42	35	44.5	25	8 - 25	4	4 x M5	15.5	8.5	46	0.02	0.183	1,270	1,530	33	18.6
	B	21	42														2,220			
60	A	60	120	175 - 4,000	56	50	57	40	14 - 32	15	4 x M6	21	15	63	0.5	0.66	3,970	6,632	49	32
	B	75	150														5,950			

Selection process for servo insert couplings, EZ2 / EZV

A	Overall length	[mm]
AB	Length AB = (A – 2xN)	[mm]
Z	Tube length Z = (A – 2xH)	[mm]
C_{Tdyn}^{E}	Combined dynamic torsional stiffness of the inserts	[Nm/rad]
C_T^{ZWR}	Torsional stiffness of tube per meter	[Nm/rad]
C_{Tdyn}^{EZ}	Torsional stiffness of the entire coupling assembly	[Nm/rad]
H	Length of the coupling	[mm]
N	Distance to center of flexible element	[mm]
TK_{max}	Max. torque	[Nm]
φ	Angle of twist	[degree]



According to torsional stiffness

$$C_{Tdyn}^{EZ} = \frac{C_{Tdyn}^{E} \times (C_T^{ZWR}/Z)}{C_{Tdyn}^{E} + (C_T^{ZWR}/Z)} \quad [Nm/rad]$$

According to angle of twist

$$\varphi = \frac{180 \times TK_{max}}{\pi \times C_{Tdyn}^{EZ}} \quad [degree]$$

Max. possible misalignments

Lateral misalignment Δ Kr

$\Delta Kr_{max} = \tan\frac{\Delta Kw}{2} \cdot AB$
$AB = A - 2xN$ [mm]

Angular misalignment Δ Kw

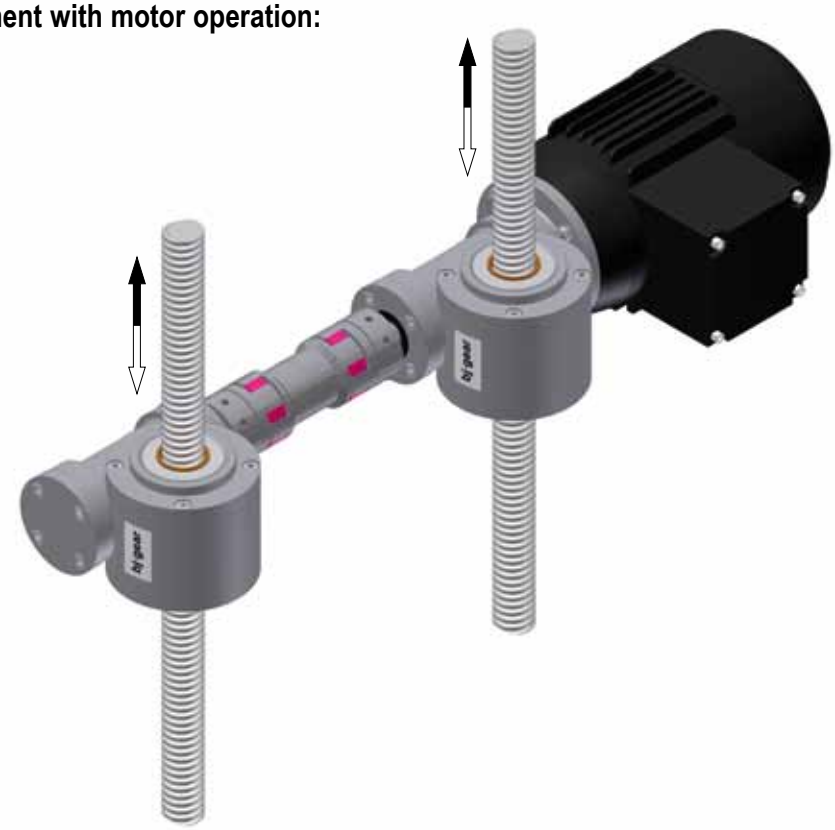
ΔKw_{max} = ca. 2°

Axial misalignment Δ Ka

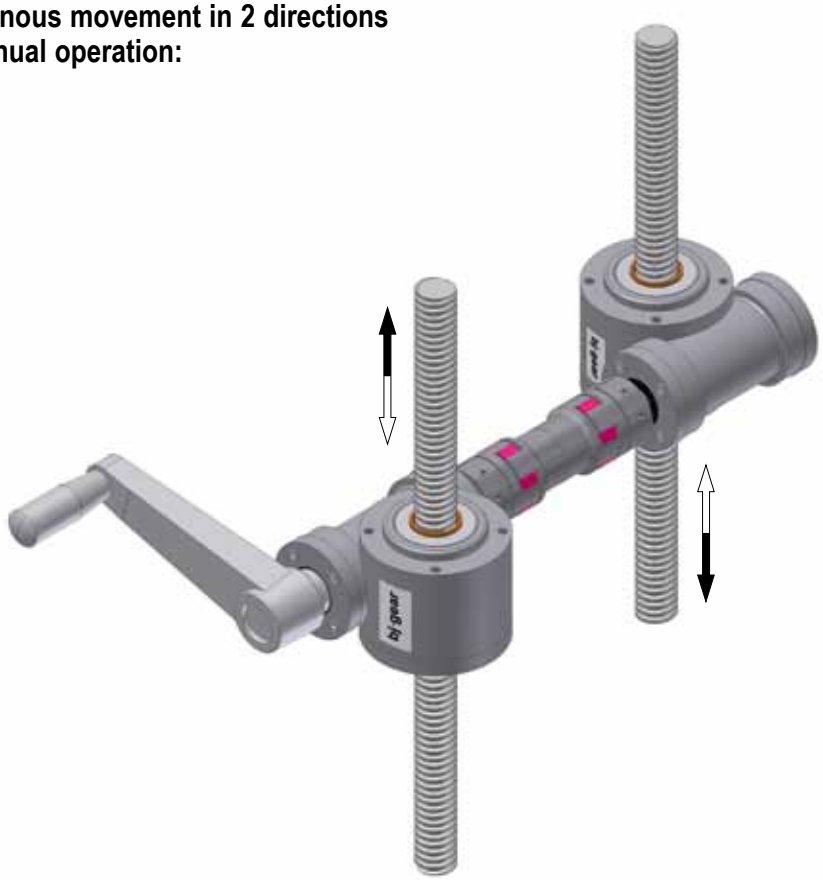
ΔKa_{max} = ca. ± 2 [mm]

M Examples of Assemblies

Synchronous movement with motor operation:

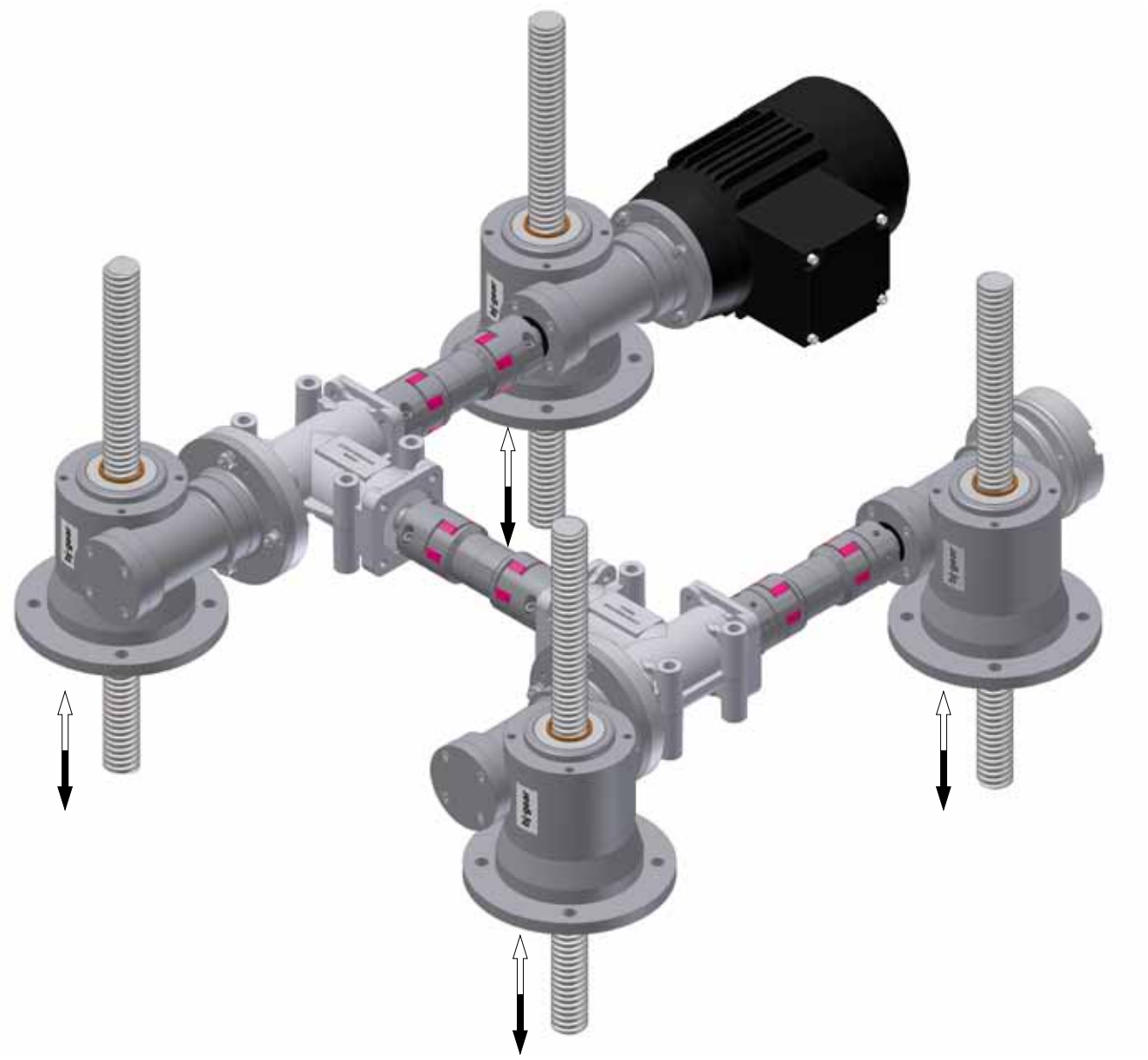


Synchronous movement in 2 directions with manual operation:



M Examples of Assemblies

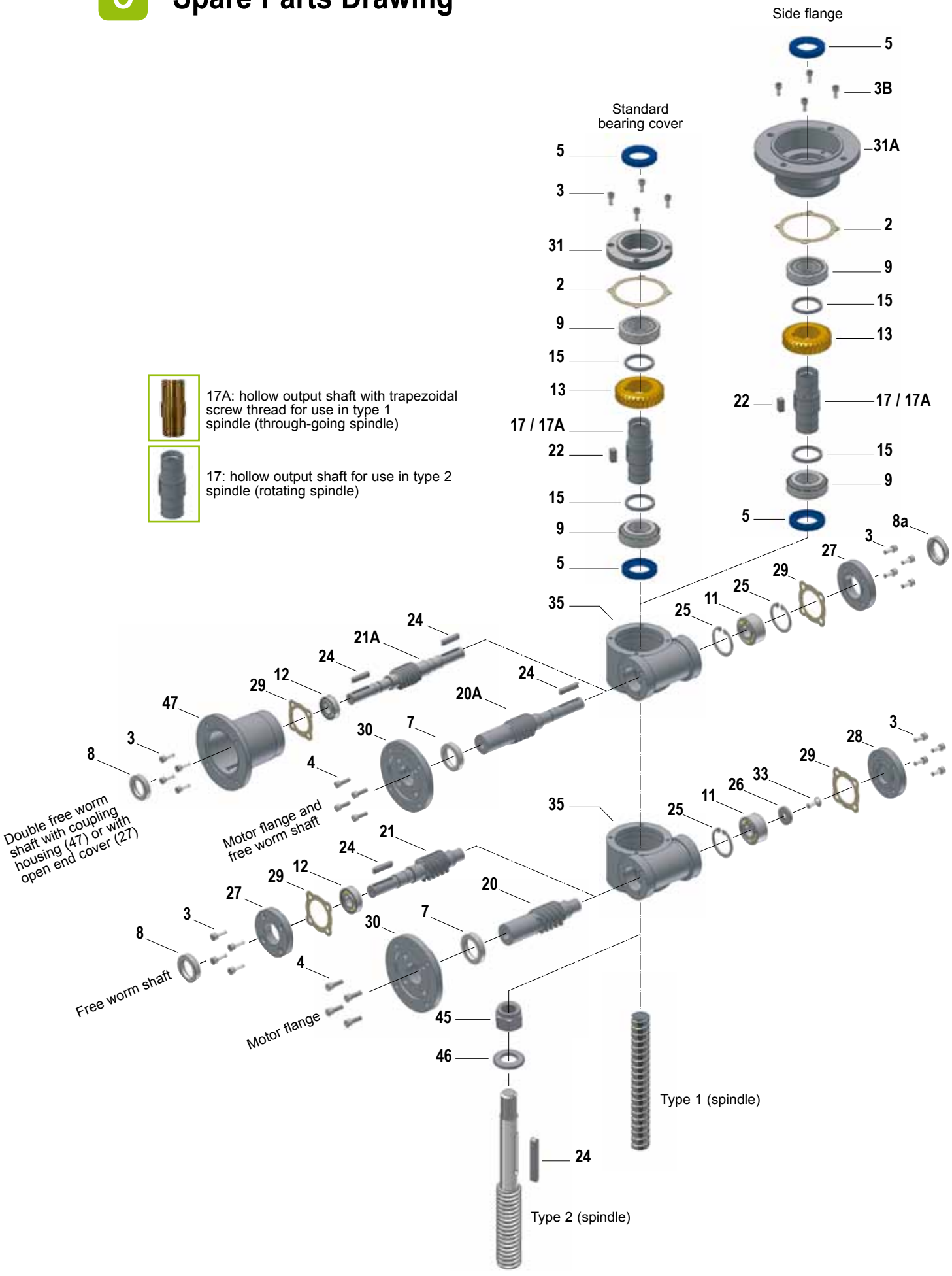
Synchronous movement with motor operation and holding brake:



N Spare Parts List

2	Gasket
3	Screw
3B	Screw
4	Screw
5	Oil Seal
7	Oil Seal
8	Oil Seal
8A	Oil Seal
9	Tapered Roller Bearing
11	Tapered Roller Bearing
12	Tapered Roller Bearing
13	Worm Wheel
15	Spacer Ring
17	Hollow Output Shaft
17A	Hollow Output Shaft
20	Hollow Worm Shaft
20A	Hollow Worm with Free Shaft
21	Free Worm Shaft
21A	Double Free Worm Shaft
22	Parallel Key B
24	Parallel Key A
25	Locking Ring
26	Washer A
27	End Cover, open
28	End Cover, closed
29	Gasket
30	Motor Flange
31	Bearing Cover
31A	Side Flange
33	Screw
35	Gear Housing
45	Lock Nut
46	Washer B
47	Copling Housing

Spare Parts Drawing



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BJ-Gear manufactures a wide standard product programme and has a high competence within adaptation of standard products and development of special products to specific customer needs. Besides, we offer transmission components of recognized manufacture making it possible to supply transmission solutions at short notice.

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