

Metric Ball Screw Jack

A BALL-BEARING TYPE HEAT-TREATED SCREW AND MATING NUT WITH ROLLING CONTACT REDUCES FRICTION TO A BARE MINIMUM IN CONVERTING TORQUE TO THRUST.

Overall operating efficiency is as high as 70% in some models, depending on the worm gear ratio.

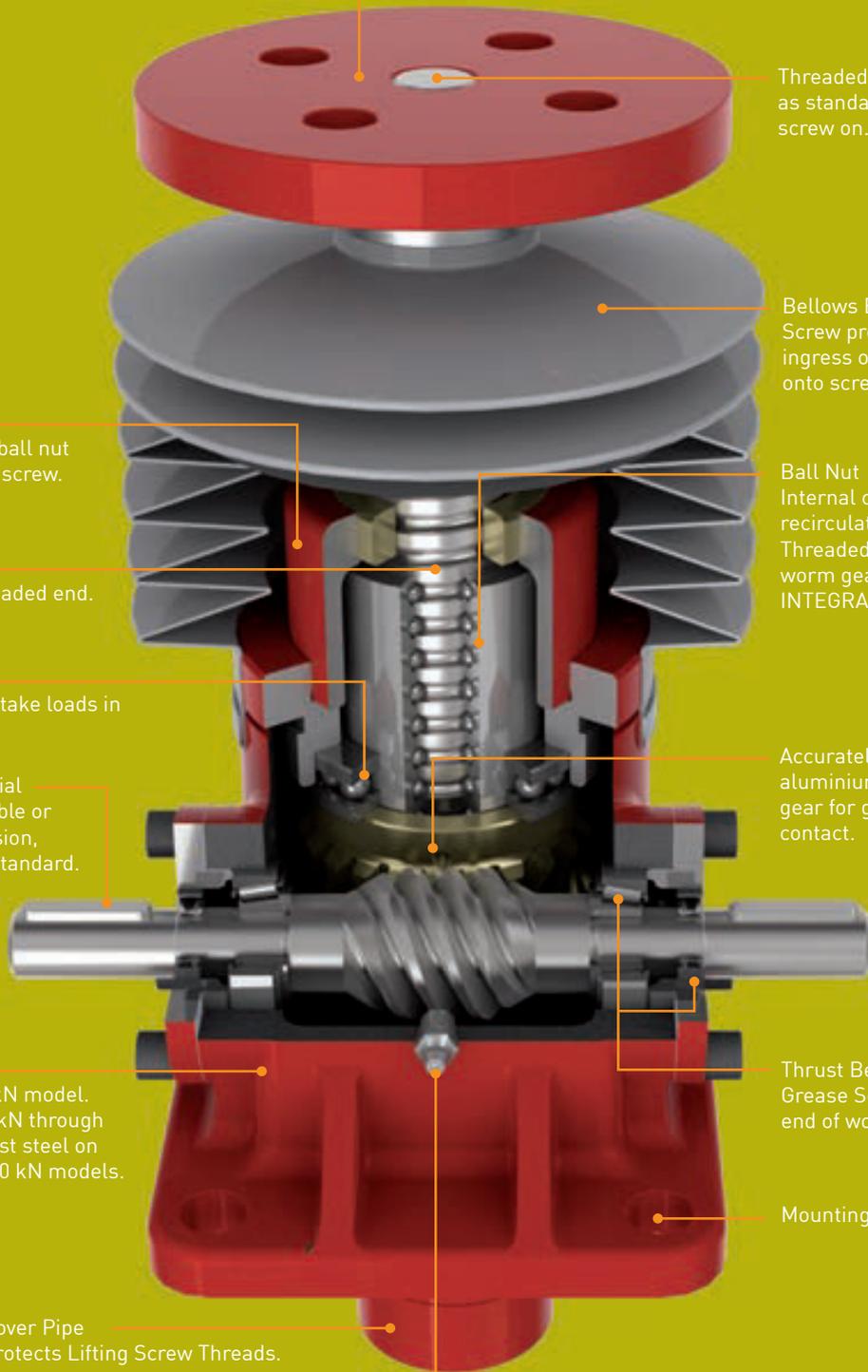


Features

- Standard Performance Power Jack
- Metric Single Face Ball Screw Jacks
- Capacities - 10kN to 500 kN as standard
- Integral safety device
- Translating and Rotating Screw in Upright and Inverted types
- Precision Worm Gear Set
- 2 Gear ratios and 2 screw leads as standard
- Pre-loaded and Anti-rotation ball screw options
- 6 mounting options including trunnion and double clevis
- Special custom designs available

End Fittings as Standard

1. Top Plate (shown)
2. Clevis End
3. Fork End
4. Rod End



Threaded end on screw as standard. End fittings screw on.

Bellows Boot
Screw protection prevents ingress of dirt and debris onto screw threads.

End Cap
Protective cap for ball nut with guide for ball screw.

Ball Nut
Internal continuous recirculation of steel balls. Threaded and secured to worm gear. Equipped with INTEGRAL SAFETY DEVICE.

Ball Screw
Standard with threaded end.

Load Bearings
Top and bottom to take loads in either direction.

Accurately hobbed aluminium bronze worm gear for greater gear contact.

Worm Shaft Material
Available with double or single shaft extension, fitted with key as standard.

Housing
Aluminium on 10 kN model. Ductile iron on 25 kN through 100 kN models, cast steel on 200 kN through 500 kN models.

Thrust Bearings and Grease Seals at each end of worm.

Mounting Bolt Holes.

Cover Pipe
Protects Lifting Screw Threads.

Grease Application Point.

Translating Screw



Upright

Inverted

Rotating Screw



Upright

Inverted

Typical Applications

Ball Screw Jacks are generally used when the application has a relatively high duty cycle or the input power for a given screw jack is to be minimised. The high efficiency of the ball screw & nut significantly increase the efficiency of a screw jack in comparison to a Machine Screw Jack. Due to their high efficiency they nearly always require a brake to hold position. They are used in a wide variety of applications including Automotive, Steel, Glass, Defence, Nuclear and Solar industries.

Selecting the Right Screw Jack

Consider all application constraints then choose a product that looks suitable for the intended application. Calculate the power and torque requirements. This is a 5 step process:

- Screw Jack Input Speed (RPM)
- Operating Input Power (kW)
- Operating Input Torque (Nm)
- Screw Jack Start-up Torque (Nm)
- Mechanical Power and Torque Check

Special Designs

1. Modifications to the standard screw jacks

This would include non-standard painting or plating of the housing, high lead ball screws, stainless steel ball screws or worm shafts, increased closed heights, extended worm shafts, opposite threading of ball screws, etc.

2. Additions to the standard screw jacks

Items such as wear indicators, safety nuts, rotation monitoring kits, special ball screw end fittings, encoder adapter flanges, etc.

3. Completely special screw jacks

Where a modification of our existing range is not practical we have the facilities to design and manufacture screw jacks tailored specifically to your requirements.

Systems

The screw jacks can be connected together in systems so that multiple units can be operated and controlled together. These jacking system arrangements or configurations can be built in many formats with the use of bevel gearboxes, motors, reduction gearbox, drive shafts, couplings, plumber blocks and motion control devices.

The use of bevel gearboxes allows the distribution of drive throughout a jacking system. The gearboxes come in 2,3 and 4 way drive types. See Neeter Drive Bevel Gearboxes brochure for more details.

Bevel gearboxes and other system components can also be supplied in stainless steel or other corrosion resistant designs.

Two of the most popular system configurations are the 'H' and 'U' configured jacking systems. Remember that multiple screw jacks can be linked together mechanically or electrically. The latter is useful if there is no space for linking drive shafts.



If multiple ball screw jacks are connected in a mechanically linked system then the complete system in some circumstances may be considered self-locking depending on the gear ratios and efficiencies of units in the system. In general, Power Jacks recommend a brake is used on **ALL** Ball Screw Jack systems. If you would like this checked, consult Power Jacks. Alternatively, to be sure, include a brake on the system either as a stand alone device or as a brake motor.



CAVENDISH LABORATORY ANTENNA DISH

Position adjustment of Arcminute Microkelvin Imager (AMI) to achieve a pointing accuracy of better than half a minute of arc (1/120 of a degree). 10 x antenna dishes all in close proximity of each other. Measuring the weight of the universe by analysing "dark matter".

10 x off 50kN E-Series special metric ball screw jacks based on EBT0050 in translating screw configuration with a stroke of 1050mm. These ball screw jacks operate in normal UK outdoor conditions and allow the antenna to operate at wind speeds of up to 50mph.

For more application examples see the 'Power at Work' brochure or www.powerjacks.com.



Screw Jack Standard Performance

Model		EBT0010 EBR0010	EBT0025 EBR0025		EBT0050 EBR0050		EBT0100 EBR0100		EBT0200 EBR0200		EBT0300 EBR0300	EBT0500 EBR0500
Capacity (kN)		10	25		50		100		200		300	500
Lifting Screw	Diameter (mm)	20	25		40		50		63		80	On request
	Pitch (mm)	5	5	10	10	20	10	20	10	20	20	
Gear Ratios	Option 1	5:1	6:1		6:1		8:1		8:1		10 2/3:1	
	Option 2	20:1	24:1		24:1		24:1		24:1		32:1	
Turn of worm for travel of Lifting Screw	Option 1	10 for 10mm	12 for 10mm	6 for 10mm	6 for 10mm	3 for 10mm	8 for 10mm	4 for 10mm	8 for 10mm	4 for 10mm	5.33 for 10mm	
	Option 2	40 for 10mm	48 for 10mm	24 for 10mm	24 for 10mm	12 for 10mm	24 for 10mm	12 for 10mm	24 for 10mm	12 for 10mm	16 for 10mm	
Maximum Input Power (kW)	Option 1	0.375	1.5		3		3.75		3.75		6	
	Option 2	0.18	0.375		0.55		1.125		1.125		1.9	
Start-up Torque at full load (Nm) †	Option 1	2.7	5.9	11.1	23.4	44.6	36.4	68.5	75.2	139.4	182	
	Option 2	1.2	2.6	4.9	10.7	20.4	19.1	35.8	39.4	72.9	107.3	
Weight (kg) - stroke = 150mm		2.8	8.17		15.88		24.72		45		86	
Weight (kg) - per extra 25mm		0.08	0.21		0.32		0.57		0.86		1.58	

† For loads of 25% to 100% of screw jack capacity, torque requirements are approximately proportional to the load.

Efficiency - Option 1 Gear Ratio

Model	EBT0010 EBR0010	EBT0025 EBR0025		EBT0050 EBR0050		EBT0100 EBR0100		EBT0200 EBR0200		EBT0300 EBR0300	EBT0500 EBR0500
Gear Ratio	5:1	6:1		6:1		8:1		8:1		10 2/3:1	Available on Request
Lifting Screw Lead (mm)	5	5	10	10	20	10	20	10	20	20	
Static Efficiency	0.603	0.565	0.600	0.567	0.595	0.546	0.581	0.529	0.571	0.492	
Dynamic Efficiency	0.681	0.662	0.692	0.663	0.687	0.645	0.674	0.631	0.665	0.595	

Efficiency - Option 2 Gear Ratio

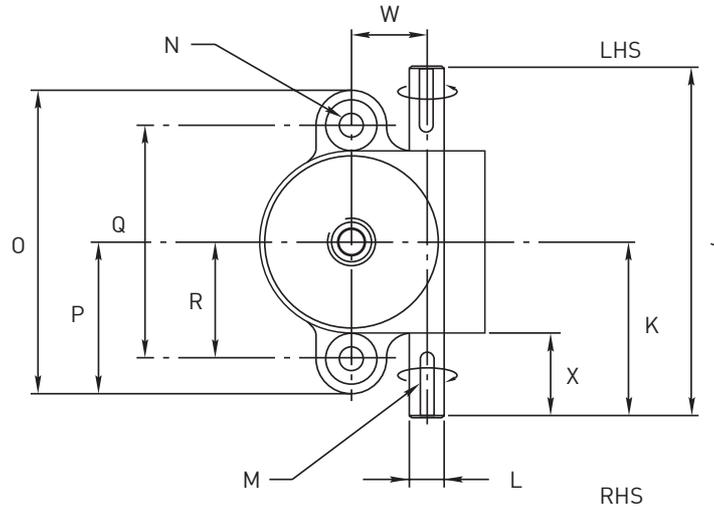
Model	EBT0010 EBR0010	EBT0025 EBR0025		EBT0050 EBR0050		EBT0100 EBR0100		EBT0200 EBR0200		EBT0300 EBR0300	EBT0500 EBR0500
Gear Ratio	20:1	24:1		24:1		24:1		24:1		32:1	Available on Request
Lifting Screw Lead (mm)	5	5	10	10	20	10	20	10	20	20	
Static Efficiency	0.341	0.320	0.340	0.310	0.325	0.348	0.370	0.337	0.364	0.278	
Dynamic Efficiency	0.429	0.419	0.438	0.407	0.422	0.450	0.470	0.440	0.465	0.371	

Note

1. Efficiency values for standard grease lubricated worm gear box and lifting screw.

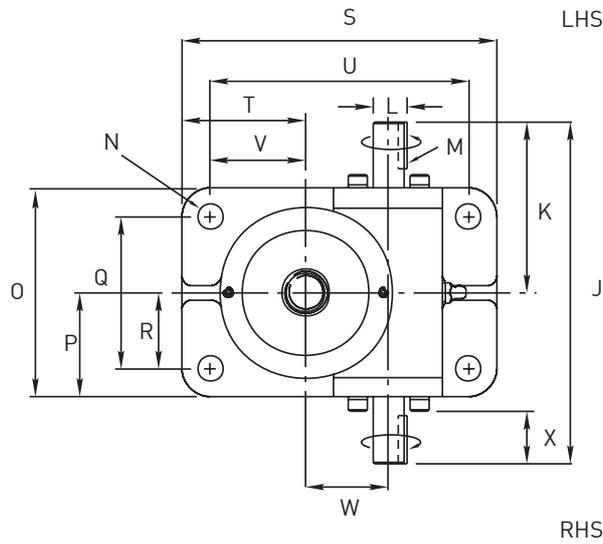
Plan View

Model:
EBT0010



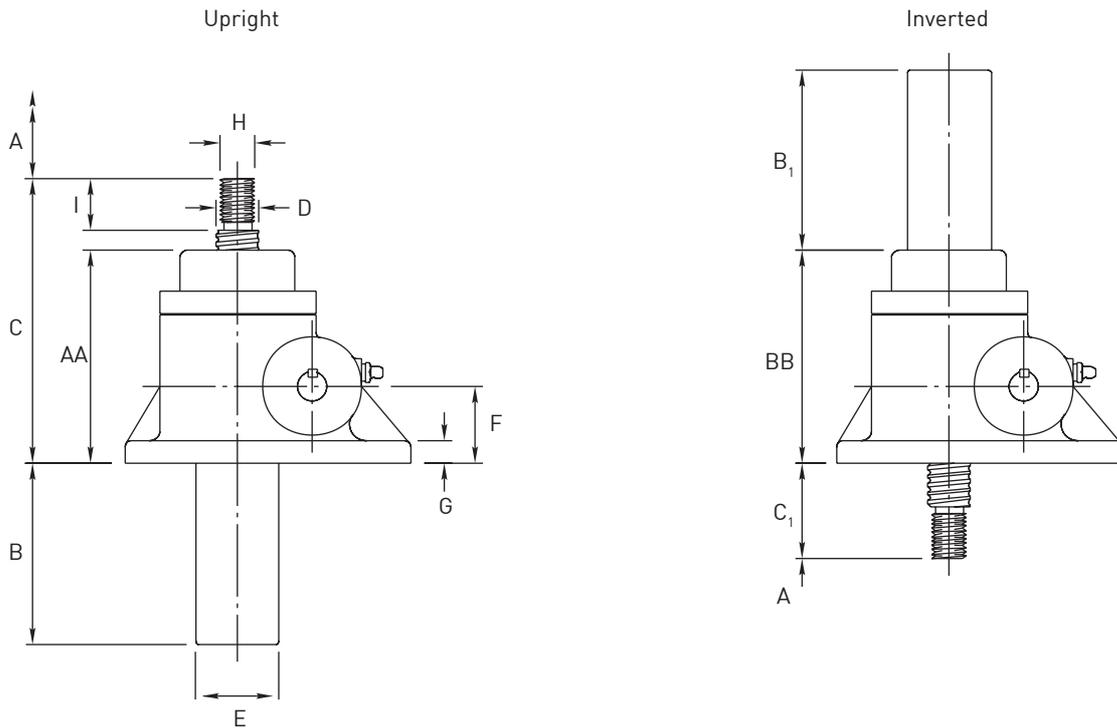
Plan View

Models:
EBT0025, EBT0050, EBT0100
EBT0200, EBT0300, EBT0500



Note

1. All dimensions in mm
3. LHS = Left Hand Side
4. RHS = Right Hand Side.



Model	EBT0010 EBR0010	EBT0025 EBR0025	EBT0050 EBR0050	EBT0100 EBR0100	EBT0200 EBR0200	EBT0300 EBR0300	EBT0500 EBR0500
Capacity (kN)	10	25	50	100	200	300	500
A	Stroke as Required						
B	A+35	A+10	A+10	A+15	A+10	A+30	
B ₁	A+35	A+25	A+25	A+25	A+25	A+25	
C	150	175 202	218 269	252 275	338 386	445	
C ₁	45	55	65	80	95	115	
D	20	25	40	50	63	80	
E	42	48.3	60.3	73	89	115	
F	40 ± 0.13	45 ± 0.13	60 ± 0.13	60 ± 0.13	85 ± 0.13	105 ± 0.13	
G	9	13	14	16	20	30	
H	M12 x 1.75	M20 x 2.5	M24 x 3	M36 x 4	M48 x 5	M72 x 4	
I	24	30	35	40	55	65	
J	150	180	230	280	300	380	
K	75	90	115	140	150	190	
øL	14 h8	16 h8	19 h8	25 h8	28 h8	35 h8	
M	5 x 5 x 25	5 x 5 x 25	6 x 6 x 32	8 x 7 x 40	8 x 7 x 40	10 x 8 x 50	
N	11	13.5	18	22	26	39	
O	130	110	150	190	210	260	
P	65	55	75	95	105	130	
Q	100	80	115	145	150	190	
R	50	40	57.5	72.5	75	95	
S	-	165	205	225	275	365	
T	-	65	75	75	105	140	
U	-	135	170	180	215	295	
V	-	50	57.5	52.5	75	105	
W	31.75 + 0.076 - 0.000	43.26 + 0.025 - 0.025	55.58 + 0.050 - 0.000	66 + 0.060 - 0.000	66 + 0.070 - 0.000	95.25 + 0.130 - 0.000	
X	36	27.5	35	44	44	56	
AA	114	134 161	172 223	197 220	268 316	360	
BB	114	134 161	172 223	197 220	268 316	360	

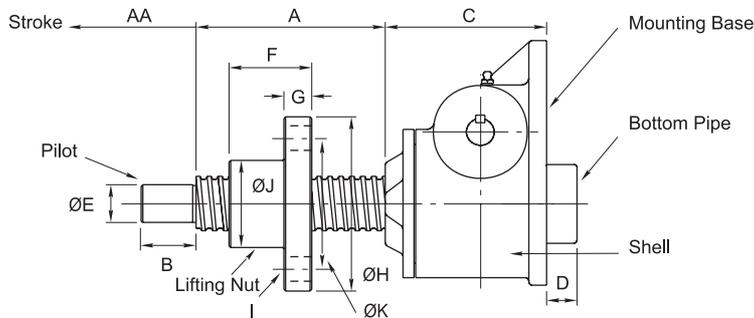
Available on Request

Note

1. All dimensions in mm.

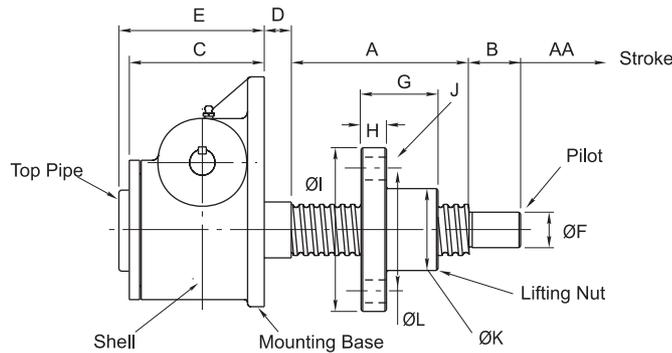
For other dimensions and performance data refer to translating screw jacks.

Upright



Model	EBR0010	EBR0025		EBR0050		EBR0100		EBR0200		EBR0300	EBR0500
Capacity (kN)	10	25		50		100		200		300	500
A	AA + 74	AA + 85	AA + 110	AA + 110	AA + 160	AA + 135	AA + 160	AA + 176	AA + 190	AA + 240	Available on Request
B	16	25		30		50		65		85	
C	90	103.5		138		146.5		195		235	
D	34	0		0		28		24		40	
ØE	12	20		25		35		45		75	
F	44	65	96	90	136	108	132	150.5	160	200	
G	12	15		20		25		35		48	
H	55	90		120		155		185		230	
I	6 x Ø7	4 x Ø13.5		4 x Ø18		4 x Ø22		4 x Ø26		4 x Ø26	
ØJ	32	40	47	60		70	75	85	95	120	
ØK(PCD)	45	65		90		115		135		175	

Inverted

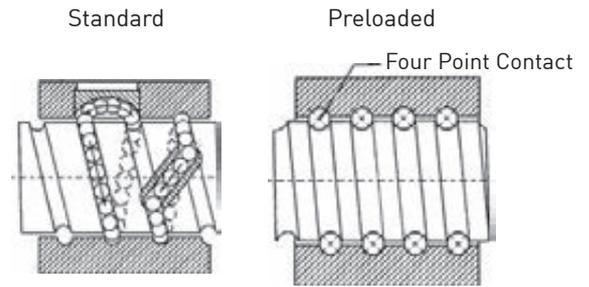


Model	EBR0010	EBR0025		EBR0050		EBR0100		EBR0200		EBR0300	EBR0500
Capacity (kN)	10	25		50		100		200		300	500
A	AA + 74	AA + 85	AA + 110	AA + 110	AA + 160	AA + 135	AA + 160	AA + 176	AA + 190	AA + 240	Available on Request
B	16	25		30		50		65		85	
C	90	95.5		122		130.5		179		235	
D	10	13.5		18		26.5		25		25	
E	90	95.5		122		130.5		203		275	
ØF	12	20		25		35		45		75	
G	44	65	96	90	136	108	132	150.5	160	200	
H	12	15		20		25		35		48	
ØI	55	90		120		155		185		230	
J	6 x Ø7	4 x Ø13.5		4 x Ø18		4 x Ø22		4 x Ø26		4 x Ø26	
ØK	32	40	47	60		70	75	85	95	120	
ØL(PCD)	45	65		90		115		135		175	

Note: 1. PCD = Pitch Circle Diameter.

Power Jacks ball nut employs the internal ball transfer system for recirculating the balls. This design provides for:

- Robust design
- Small ball nut body outer diameter
- Smooth movement
- Less turns per circuit
- Absence of parts liable to wear.



Solid formed nylon wiper seals on the ball nut prevents ingress of foreign matter and retain lubrication within the nut.

Integral Safety Device

All Power Jacks Metric Ball Screw Jacks have an integral safety device as standard. This provides two important safety roles:

1. In the unlikely event of an excessive wear in the ball screw drive, the safety device will contact the screw shaft and act as an “ACME” Thread. This will provide early warning of any possible ball screw failure and is capable of providing drive in the event of any such failure. This can allow a control system to alert an operator to wear of this kind by monitoring the increase in motor current required to drive the system due to the increased friction generated by the device.
2. It allows the ball nut on the screw jack to sustain a load in the event of catastrophic ball failure. The safety of industrial and human cargo is therefore improved. Ball screw systems without this device could collapse under load or drop the carried load.

Note: Model E28501 ball screw jack does not have safety device as standard, if required consult Power Jacks Ltd.

Preloaded for Reduced Axial Backlash

Metric Ball Screw Jacks can be provided with preloaded ball nuts to give reduced axial backlash as a high efficiency alternative to the metric machine screw anti-backlash option. Preloading on the ball nut is obtained by the “Interference Ball” method. By fitting interference balls in the ball nut to obtain a diametral interference fit and using the ogival track form, a four-point contact results.

Ball Screw Life

Theoretical service life can be expressed in either L_{10} 10^6 revolutions or L_h 10^3 hours or L_d kilometres. As the life of a ball screw is determined by metal fatigue it is not possible to accurately predict life. However, it is practical to suppose that 90% of a sufficiently large number of equally sized ball screws running under equal working conditions will reach L_{10} or L_h without evidence of material fatigue. The L_{10} ball screw life is rated using the Dynamic Capacity, which is the maximum constant axial load that can be applied in running conditions for a life of 1.10^6 revolutions of the ball screw. This can be expressed in linear travel [L_d].

Where L_{10} = Service Life (millions of revolutions)
 L_d = Service Life (km)
 P = Pitch of Ball Screw (mm)

$$L_d = L_{10} * P$$

Model	Linear Travel L_d in km		Working Load [kN]										
	Capacity [kN]	Pitch [mm]	5	10	25	30	50	75	100	150	200	250	300
EBT0010	10	5	20.5	2.5	-	-	-	-	-	-	-	-	-
EBT0025	25	5	381	48	3	-	-	-	-	-	-	-	-
EBT0025	25	10	1 775	222	14	-	-	-	-	-	-	-	-
EBT0050	50	10	11 978	1 497	96	55	12	-	-	-	-	-	-
EBT0050	50	20	17 039	2 130	136	79	17	-	-	-	-	-	-
EBT0100	100	10	32 287	4 036	258	149	32	10	4	-	-	-	-
EBT0100	100	20	38 503	4 813	308	178	39	11	5	-	-	-	-
EBT0200	200	10	162 327	20 291	1 299	752	162	48	20	6	3	-	-
EBT0200	200	20	320 060	40 008	2 560	1 482	320	95	40	12	5	-	-
EBT0300	300	20	903 882	112 985	7 231	4 185	904	268	113	33	14	7	4

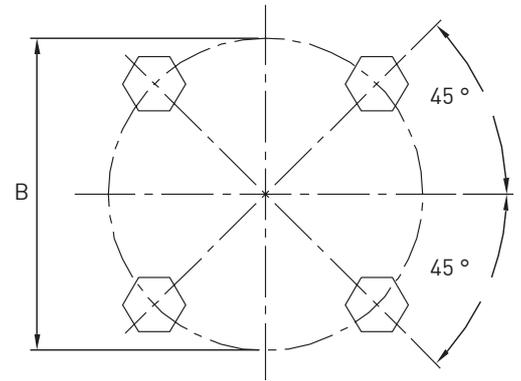
Use the following formulae to calculate the service life in terms of hours running:

Where L_h = Service Life (hours)
 L_{10} = Service Life (revolutions)
 n_m = Mean Screw Jack Input Speed (rpm)
 Gr = Gear Ratio

$$L_h = \frac{L_{10} * Gr}{60 * n_m}$$

Note: 1. Ball screw life based on dynamic load calculated according to DIN69051 Part 4.

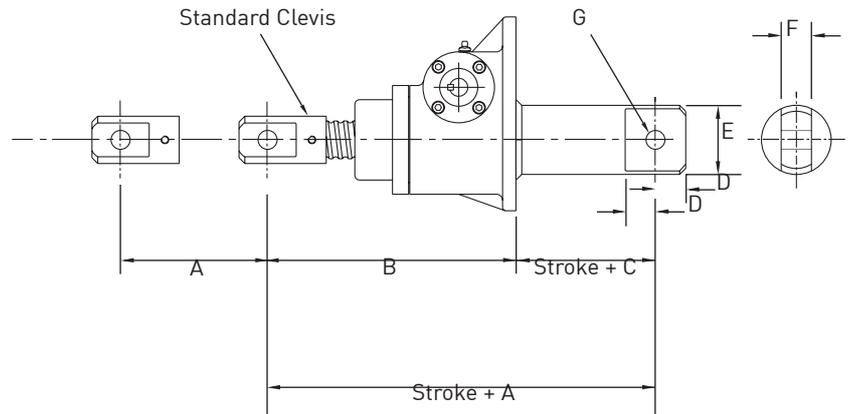
Model	'B' Bolt PCD (mm)	Bolt Information
EBT0010	n/a	n/a
EBT0025	46	M6 x 1mm Pitch, 14mm Deep
EBT0050	61	M8 x 1.25 Pitch, 22mm Deep
EBT0100	70	M8 x 1.25 Pitch, 14mm Deep
EBT0200	88	M10 x 1.5mm Pitch, 14mm Deep
EBT0300	107	M10 x 1.5mm Pitch, 19mm Deep
EBT0500	135	M16 x 2mm Pitch, 25mm Deep



Note

1. All dimensions in millimetres unless otherwise stated.

Double Clevis End Ball Screw Jacks



Model	EBT0010	EBT0025		EBT0050		EBT0100		EBT0200		EBT0300	EBT0500
Capacity (kN)	10	25	25	50	50	100	100	200	200	300	500
A	Available on Request	260	287	313	364	427	450	525	573	Available on Request	Available on Request
B		202	229	245	296	299	322	386	434		
C		58	58	68	68	128	128	139	139		
D		23	23	30	30	33	33	40	40		
E		48.3	48.3	60.3	60.3	73	73	102	102		
F		30	30	35	35	40	40	50	50		
G		16	16	20	20	22	22	30	30		
Max Raise at Max Rated Load in Compression		280	200	600	560	658	588	769	621		

Note

1. For other performance and dimension information refer to translating screw models.
2. All dimensions in millimetres unless otherwise stated.

The anti-rotation device is available for translating ball screw models only. It is used only when the load to be moved (actuated) may rotate, i.e. the screw is unguided and does not prevent rotation.

The anti-rotation device consists of a square steel tube which guides the movement of a square aluminium bronze guide block fitted to the end of the ball screw. The guide block also acts as a stop nut.

Model	EBT0010	EBT0025	EBT0050	EBT0100	EBT0200	EBT0300	EBT0500
Capacity (kN)	10	25	50	100	200	300	500
A	AOR	50	70	AOR	AOR	AOR	AOR
B	AOR	50	60	AOR	AOR	AOR	AOR
C	AOR	90	115	AOR	AOR	AOR	AOR
D	AOR	16	20	AOR	AOR	AOR	AOR

Note

1. AOR = Application On Request, consult Power Jacks Ltd.
2. All dimensions in millimetres unless otherwise stated.

