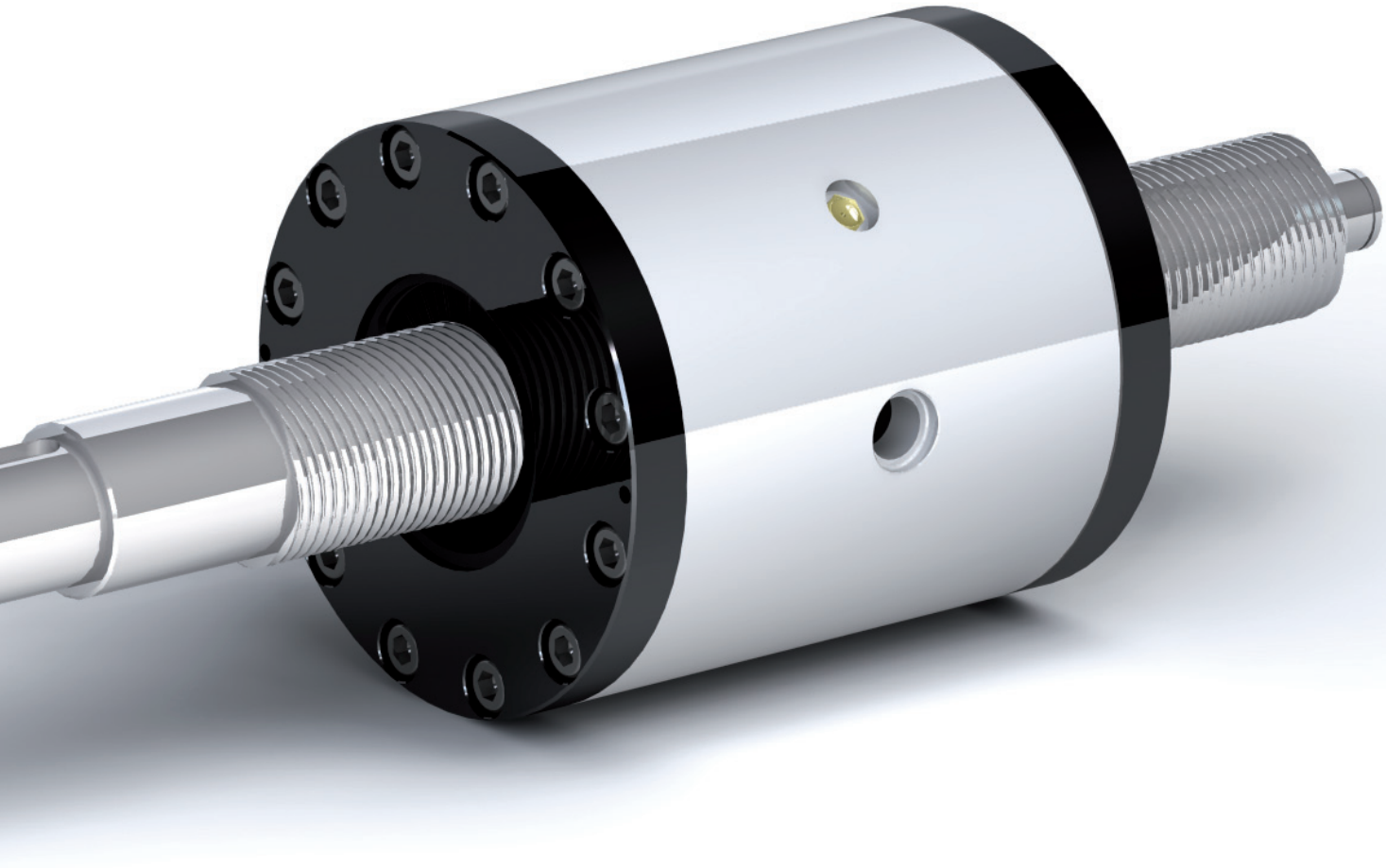


PLANETARY ROLLER SCREW - SPIRACON™

3 Step Product Selection Guide

POWER JACKS

3.1.5 How to Select a Spiracon Roller Screw

Step 1 - Load, Speed and Life

From the Technical Chart in Section 3.1.6., make an initial selection of a Spiracon™ model to suit the required maximum dynamic and static loads.

Choose a screw lead and calculate the rotational speed to suit the required linear speed:

$$\textbf{Rotational speed} = \frac{\text{Linear speed (mm/minute)}}{\text{Screw lead (mm)}}$$

Check that the rotational speed is below the maximum speed shown in the Technical Chart for the model selected.
Calculate the total number of revolutions of the screw for the operating life required:

Required no. of screw revs. = Life (hours) x Rotational speed (rpm) x 60

Check the operating life for the selected Spiracon™ model:

C = Dynamic capacity (kN) from Technical Chart
F = Application dynamic load (kN) (or Fm, mean load as below)

$$\textbf{Actual no. of screw revs.} = \left(\frac{C}{F}\right)^{3.33} \times 10^6$$

$$\therefore \textbf{ Actual life in hours} = \frac{\text{No. of screw revs.}}{\text{Rotational speed x 60}}$$

If required, reiterate the calculation to achieve the required life.
Where the dynamic load varies, the mean load (Fm) can be approximated as follows:

$$\textbf{FM} = \sqrt[3]{\frac{(F1^3 \times U^1) + (F2^3 \times U2) + \ldots}{U}}$$

F1, F2 = constant loads during U1, U2 revolutions

U = total number of revolutions

Where the dynamic load varies between a minimum (Fmin) and maximum (Fmax) the mean load is :

$$\textbf{FM} = \frac{\text{Fmin} + 2 \times \text{Fmax}}{3}$$

Step 2 - Critical Speed, Buckling and Deflection

Establish length (L) based on the required stroke and bearing support conditions. For length (L), check that the rotational speed is below the critical speed limit, given by the formula:

$$\text{Critical speed limit (rpm)} = \frac{10^7 \times f1 \times J}{L^2}$$

Where f1, f2 and f3 are defined by the bearing support conditions shown in the diagram overleaf, and J is the root diameter of the Spiracon™ thread given in the Technical Chart in section 3.1.6

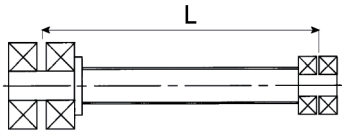
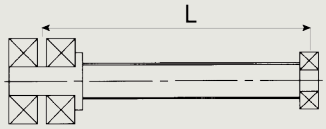
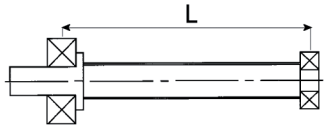
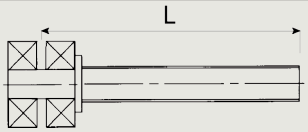
Where the screw is under a compression load, check that the chosen screw diameter and length (L) are within the load limit for buckling, given by the formula:

$$\text{Load limit (N)} = \frac{10^4 \times f2 \times J^4}{L^2}$$

For long horizontal screws, check the deflection of the screw under its own weight:

$$\text{Deflection (mm)} = \frac{6 \times 10^{-9} \times L^4}{f^3 \times J^2}$$

Bearing Support Conditions

		f1	f2	f3
1		21	12.5	384
2		15	6.5	185
3		9.5	3	77
4		3.4	0.8	8

Step 3 - Torque and Power

Calculate the torque required to drive the screw:

$$\text{Torque (Nm)} = \frac{\text{Dynamic load (N) x Lead (mm)}}{2000 \times \pi \times \text{Efficiency (0.85)}}$$

$$\text{Power (kW)} = \frac{\text{Torque (Nm) x Rotational speed (rpm)}}{9550}$$

Note: Where there is a high acceleration or inertia, please consult out Technical Sales Department.

Planetary Roller Screw - Spiracon™
Selection Example

Example
Select a standard right hand Spiracon™ screw and nut for the following:

Dynamic load	=	220 kN (in compression)
Linear speed	=	900 mm/minute
Required life	=	2000 hours
Required stroke	=	1200 mm
Overall screw length	=	1850 mm
Screw mounting	=	Vertical
Bearing support condition	=	2

Step 1
From the chart in section 3.1.6, make initial selection of:

Model 65 x 36 lead

Select a lead of 36 mm to give a rotational speed of:

$$\frac{900}{36}$$ **= 25 rpm (OK<1700 rpm)**

Calculate the number of revolutions of the screw to give the required life:

Required no. of screw revs. = 2000 x 25 x 60 = 3 x 106

Check the operating life for selected Spiracon™ model:

Actual no. of screw revs. = $\frac{310^{333}}{220} \times 10^{6}$ **= 3.14 x 106 (OK>3 x 10^6)**

∴ **Actual life in hours =** $\frac{3.14 \times 10^{6}}{25 \times 60}$ **= 2093 hours (OK>2000 hours)**

Step 2
Stroke = 1200 mm
Length (L) = 1600 mm (refer bearing support condition)

Check the critical speed limit:

Speed limit (rpm) = $\frac{10^{7} \times 10 \times 63.7}{1600^{2}}$ **= 2488 rpm (OK>25 rpm)**

Check for buckling of the screw:

Load limit (N) = $\frac{10^{4} \times 6.5 \times 63.7^{4}}{1600^{2}}$ **= 418 kN (OK>220 kN)**

Planetary Roller Screw - Spiracon™
Selection Example

Step 3
The torque and power are:

$$\text{Torque (Nm)} = \frac{220000 \times 36}{2000 \times \pi \times 0.85} = 1483 \text{ Nm}$$

$$\text{Power (kW)} = \frac{1483 \times 25}{9550} = 3.88 \text{ kW}$$

∴ The complete product code is SPT-065-36-6-RH-1850-1500-1-0 (refer 3.1.3 for full product code description)

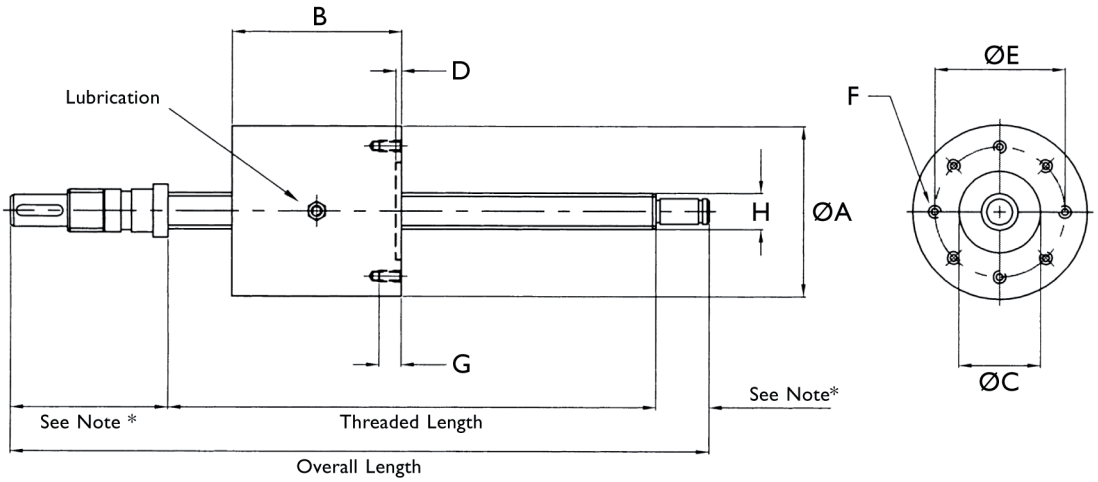
Example Part Number

(1)				(2)				(3)			(4)		(5)			(6)				(7)				(8)		(9)
S	P	T	-	0	6	5	-	3	6	-	6	-	R	H	-	1	8	5	0	-	1	5	0	0	-	1	-	0

(1) Spiracon™ Screw and Nut
(2) Model 65
(3) 36 mm Lead
(4) 6 mm Pitch
(5) Right Hand Thread
(6) 1850 mm Overall Screw Length
(7) 1500 mm Screw thread Length
(8) 1 Spiracon™ Nut
(9) Standard Mounting Holes

Notes
1. **In all cases, the customer should supply a detailed drawing, indicating the screw matching details.**
2. Where a standard unit does not meet the customer's requirements, Power Jacks will be pleased to design a special unit.
3. All goods are sold subject to Power Jacks Standard Terms and Conditions of Sale, full details available upon request.

Planetary Roller Screw - Spiracon™
Technical Data and Dimensions



Note

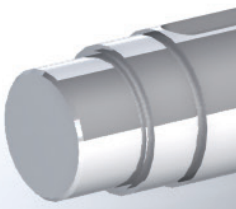
* = Customer to define at time of ordering

øj = Root diameter of Roller screw

3.1.6 Technical Data and Dimensions

Model	Lead	Pitch	Dynamic C (kN)	Static Co (kN)	NUT							SCREW			WEIGHTS	
					AØ	B	CØ H6	D	E PCD	F Dia x No	G	HØ	JØ min	Max Speed (rpm)	Nut (kg)	Screw per 100 mm (kg)
15	6	1	45	68	92	90	34	4	55	M8 X 6	12	17	15.3	5500	3.5	0.18
	12	2	35	52	92	90	34	4	55	M8 X 6	12	17	15.3	5500	3.5	0.18
20	6	1	58	87	103	110	45	4	58	M8 X 8	12	21	18.4	4900	5.5	0.27
	12	2	58	87	103	110	45	4	58	M8 X 8	12	21	18.4	4900	5.5	0.27
	18	3	50	74	103	110	45	4	58	M8 X 8	12	21	18.4	4900	5.5	0.27
30	6	1	100	150	125	130	50	4	70	M10 X 8	15	30.8	28.2	4300	9.3	0.55
	18	3	90	120	125	130	50	4	70	M10 X 8	15	30.8	28.2	4300	9.3	0.55
	24	3	105	150	125	130	50	4	70	M10 X 8	15	30.8	28.2	4300	9.3	0.55
40	12	2	120	180	135	135	65	4	83	M12 X 8	18	39	35.5	3300	11	0.92
	24	3	128	192	135	135	65	4	83	M12 X 8	18	39	35.5	3300	11	0.92
	32	4	115	172	135	135	65	4	83	M12 X 8	18	39	35.5	3300	11	0.92
45	12	2	190	285	170	180	75	5	105	M16 X 8	24	46.6	41.3	2600	23.2	1.3
	24	4	170	255	170	180	75	5	105	M16 X 8	24	46.6	41.3	2600	23.2	1.3
	48	6	120	180	170	180	75	5	105	M16 X 8	24	46.6	41.3	2600	23.2	1.3
55	12	2	290	435	205	229	85	5	128	M20 X 8	30	56.1	50.9	2100	44	1.92
	24	4	270	405	205	229	85	5	128	M20 X 8	30	56.1	50.9	2100	44	1.92
	48	6	275	410	205	229	85	5	128	M20 X 8	30	56.1	50.9	2100	44	1.92
65	24	4	340	500	240	250	95	5	150	M20 X 8	30	68.8	63.7	1700	66.5	2.83
	36	6	310	465	240	250	95	5	150	M20 X 8	30	68.8	63.7	1700	66.5	2.83
	54	6	310	455	240	250	95	5	150	M20 X 8	30	68.8	63.7	1700	66.5	2.83
75	24	4	380	570	275	260	105	6	165	M20 X 8	30	75.2	70.1	1600	87.4	3.45
	36	6	340	510	275	260	105	6	165	M20 X 8	30	75.2	70.1	1600	87.4	3.45
	54	6	340	510	275	260	105	6	165	M20 X 8	30	75.2	70.1	1600	87.4	3.45
90	24	4	530	795	315	310	120	8	200	M24 X 10	35	90	85	1200	137	4.96
	36	6	520	780	315	310	120	8	200	M24 X 10	35	90	85	1200	137	4.96
	54	6	615	920	315	310	120	8	200	M24 X 10	35	90	85	1200	137	4.96
120	24	4	950	425	420	400	150	8	250	M24 X 12	50	120	115	1000	310	8.82
	40	5	1200	1800	420	400	150	8	250	M24 X 12	50	120	115	1000	310	8.82
	54	6	1200	1800	420	400	150	8	250	M24 X 12	50	120	115	1000	310	8.82

Dimensions are subject to change without notice.



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