

The Spiracon® range

There are 10 standard Spiracon® roller screw models, available with diameters from 15mm to 120mm (0.6-4.75 inches) and a choice of three lead variations per model size. Dynamic load capacities of over 1,200 kN (130 tons) and linear speeds of over 30 m/min (1100 inches/min) are possible. Where the standard range does not meet the application specification, special roller screws can be designed to meet customers' specific requirements. (see **Specials** section on page 11)

Efficiency

The Spiracon® roller screw has an efficiency of 85%—minimizing power consumption and screw system size. Such high efficiency means that the screw is not self-sustaining and a braking system is needed to prevent back driving.

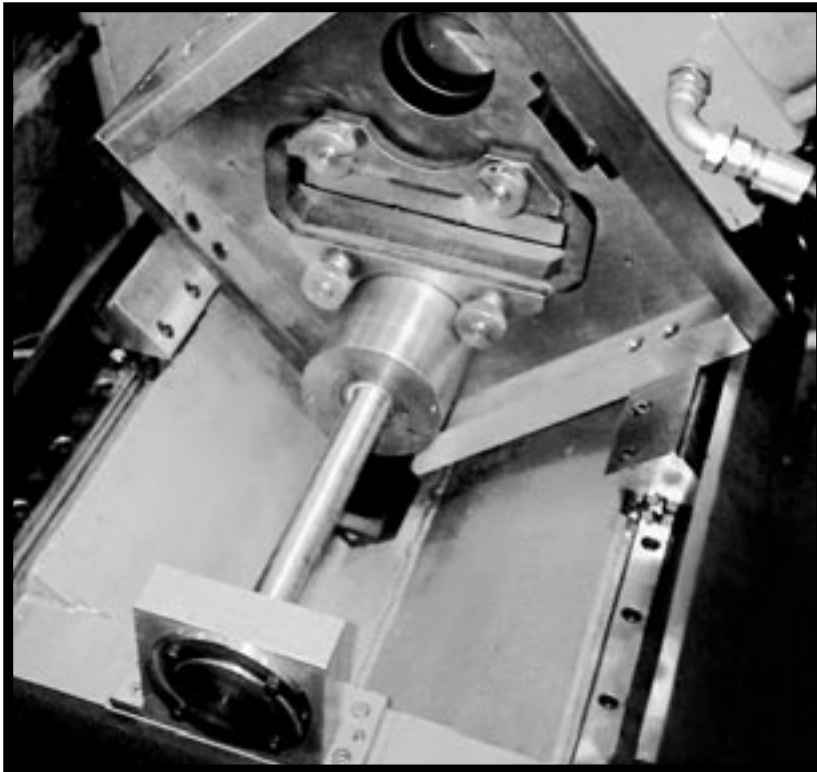
Tolerance

Highly accurate machining and assembly of each roller screw achieves total axial play of less than 0.01mm (0.0004 inches). The cumulative pitch error in the screw is typically less than 5 microns per 300mm. (0.00019 inches per ft.). Combined with a high stiffness, this means that accurate and repeatable positioning is possible. The screw straightness is within 0.1mm:1,000mm (0.004 inches:36 inches).

Operating life

Operating life is dependent upon the dynamic load. The maximum dynamic loads shown in the technical chart on page 14 are equivalent to 1,000,000 revolutions of the screw. To determine actual operating life, please refer to *How to select a Spiracon® roller screw* on pages 12 and 13. Where severe operating conditions exist, please consult our product engineers.





the entry of large particles into the nut mechanism, and bellows can be provided to protect the screw. Please contact our factory to discuss hostile or hazardous operating environments.

Lubrication and maintenance

Spiracon® roller screws require only a minimum of maintenance during the normal operating life. Depending upon the duty, periodic lubrication should be carried out through the nipple using Rocol MTS 1000 grease or equivalent.

Specials

Spiracon® can be offered to suit applications requiring:

- Special screw diameters or leads
- Left hand screw threads
- Very high dynamic load (over 1,200kN/130 tons)
- Special materials such as stainless steel
- Extreme temperatures and hazardous environments
- Special screw end machining or nut mounting

Mounting

The Spiracon® nut can be mounted using the standard mounting holes and location diameter. Screw end machining to suit thrust bearings is standard unless the customer requests custom machining. Mounting for operation in any orientation is possible.

Screw length

The screw length is determined by the load and speed conditions (please refer to step 2 of *How to select a Spiracon® roller screw* on page 12 and 13). For total screw lengths greater than shown in the table at the bottom of this page, please consult our product engineers.

Guiding the load

Loads must be guided to remove any possible sideload from the Spiracon® nut. The guide system will resist the torque developed by the roller screw mechanism.

Operating environment

All units are designed for industrial operating conditions. Normal operating temperatures are from -10°C (+26°F) to +50°C (+122°F). However, our products have been proven in temperatures as low as -30°C (-22°F) (Arctic), and as high as +70°C (+158°F) (steelworks). Wiper seals prevent

Model	Maximum length
Up to 20	2 meters (75 inches)
30 to 90	6 meters (230 inches)
120	3 meters (118 inches)

How to select a Spiracon® roller screw

Three simple steps

Step 1 Load, speed and life

From the technical chart on page 14, 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:

$$\text{Rotational speed} = \frac{\text{linear speed mm/minute}}{\text{screw lead (mm)}}$$

Check that the rotational speed is below the maximum rpm shown in the technical chart for the model selected.

lel	Lead	Pitch	Dynamic C (kN)	Static Co (kN)	AØ	B	CØ H6	D	E PCD	M
	6	1	45	68	92	90	34	4	55	
	12	2	35	52	92	90	34	4	55	
	6	1	58	87	103	110	45	4	58	

Calculate the total number of revolutions of the screw or the operating life required:

$$\text{Required number of revolutions} = \text{life (hours)} \times \text{rotational speed (rpm)} \times 60$$

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)

$$\text{Actual number of screw revolutions} = \left(\frac{C}{F}\right)^{3.33} \times 10^6$$

$$\text{Actual life in hours} = \frac{\text{number of screw revolutions}}{\text{rotational speed} \times 60}$$

If required, repeat the calculation with a larger size to achieve the required life.

Where the dynamic load varies, the mean load (Fm) can be approximated as follows:

$$F_m = \sqrt[3]{\frac{(F_1^3 \times U_1) + (F_2^3 \times U_2) + \dots}{U}}$$

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:

$$F_m = \frac{F_{\min} + 2 \times F_{\max}}{3}$$

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 as given by the formula:

$$\text{Critical speed limit (rpm)} = \frac{10^7 \times f_1 \times J}{L^2}$$

Figures f1, f2 and f3 are defined by the bearing support conditions shown in the chart on page 13, and J is the root diameter of the Spiracon® thread given in the technical chart on page 14.

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

$$\text{Load limit (N)} = \frac{10^4 \times f_2 \times J^4}{L^2}$$

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

$$\text{Load limit (N)} = \frac{6 \times 10^{-9} \times L^4}{f_3 \times J^2}$$

Step 3 Torque and Power

Calculate the torque required to drive the screw:

$$\text{Torque (Nm)} = \frac{\text{Dynamic load (N)} \times \text{lead (mm)}}{2,000 \times \pi \times \text{Efficiency (0.85)}}$$

$$\text{Power (kW)} = \frac{\text{Torque (Nm)} \times \text{rotational speed (rpm)}}{9,550}$$

Note: Where there is a high acceleration or inertia, please consult our product engineers.

How to select a Spiracon® roller screw

Example

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

Dynamic load	= 220 kN (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 on page 14, make initial selection of:
Model 65 x 36 lead

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

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

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

$$\text{Required no. of screw revs.} = 2000 \times 25 \times 60 = 3 \times 10^6$$

Check the operating life for selected Spiracon® model:

$$\begin{aligned} \text{Actual no. of screw revs.} &= \left(\frac{310}{220}\right)^{3.33} \times 10^6 \\ &= 3.14 \times 10^6 > 3 \times 10^6 \end{aligned}$$

$$\text{Actual life in hours} = \frac{3.14 \times 10^6}{25 \times 60} = 2093 \text{ hrs} > 2000 \text{ hrs}$$

Step 2

Stroke = 1200 mm

Length (L) = 1600 mm (see page 14)

Check the critical speed limit of the screw:

$$\begin{aligned} \text{Actual no. of screw revs.} &= \frac{10^7 \times 10 \times 63.7}{1600^2} \\ &= 2488 \text{ rpm} > 25 \text{ rpm} \end{aligned}$$

Check for buckling of the screw:

$$\begin{aligned} \text{Load limit (N)} &= \frac{10^4 \times 6.5 \times 63.7^4}{1600^2} \\ &= 418 \text{ kN} > 220 \text{ kN} \end{aligned}$$

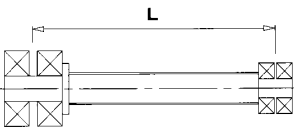
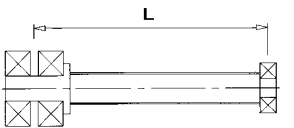
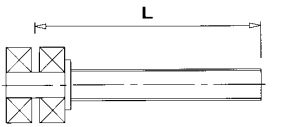
Step 3

The torque and power are:

$$\text{Torque (Nm)} = \frac{220000 \times 36}{2,000 \times \pi \times 0.85} = 1483 \text{ Nm}$$

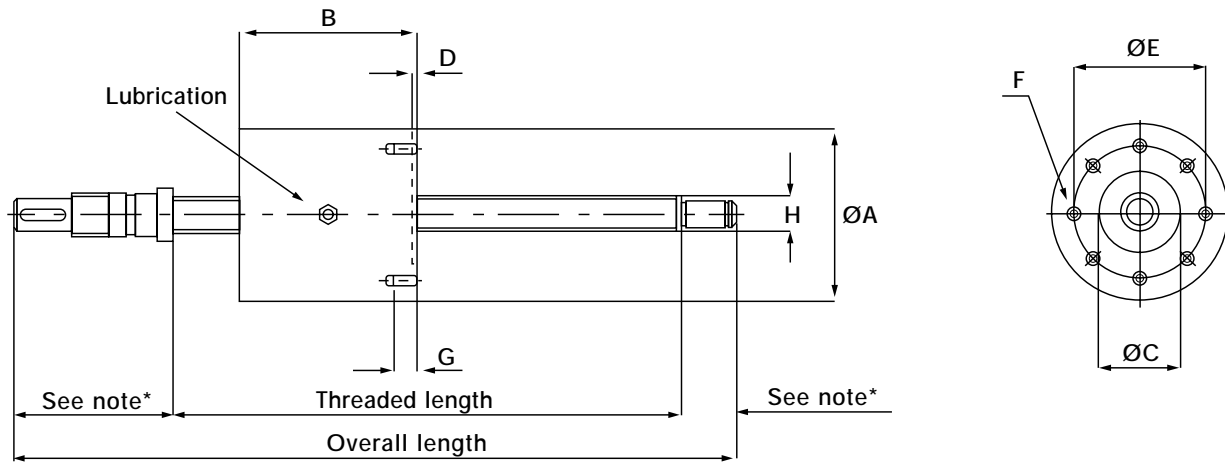
$$\text{Power (kW)} = \frac{1483 \times 25}{9550} = 3.88 \text{ kW}$$

The complete product code is
SPT-065-36-6-RH-1850-1500-1-0
(see page 15 for full breakdown of this code)

Bearing Support Conditions	f1	f2	f3
 <p>1.</p>	15	12.5	384
 <p>2.</p>	10	6.5	185
 <p>3.</p>	2.3	0.8	8

Spiracon® roller screws

Outline drawings



Note: * = Customer to define at time of ordering.

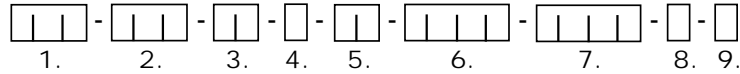
Technical/dimensional chart

(All dimensions are in millimeters)

Model	Lead	Pitch	Dynamic C (kN)	Static Co (kN)	AØ	B	CØ H6	D	E	Nut			Nut inertia kgm ²	HØ	JØ min	Screw		Approx. Weights	
										Mounting Thread Size	Pattern No. of Bolts	G				Max Speed (rpm)	Screw inertia kgm ² /m	Nut (kg)	Screw per 100 mm (kg)
15	6	1	45	68	92	90	34	4	55	M8 x1.25	6	12	1.65 x 10 ⁻⁴	17	15.3	5500	5.81 x 10 ⁻⁶	3.5	0.18
	12	2	35	52	92	90	34	4	55	M8 x1.25	6	12	1.69 x 10 ⁻⁴	17	15.3	5500	5.41 x 10 ⁻⁶	3.5	0.18
20	6	1	58	87	103	110	45	4	58	M8 x1.25	8	12	2.92 x 10 ⁻⁴	21	18.4	4900	1.38 x 10 ⁻⁵	5.5	0.27
	12	2	58	87	103	110	45	4	58	M8 x1.25	8	12	2.99 x 10 ⁻⁴	21	18.4	4900	1.3 x 10 ⁻⁵	5.5	0.27
	18	3	50	74	103	110	45	4	58	M8 x1.25	8	12	3.05 x 10 ⁻⁴	21	18.4	4900	1.2 x 10 ⁻⁵	5.5	0.27
30	6	1	100	150	125	130	50	4	70	M10 x1.5	8	15	6.73 x 10 ⁻⁴	30.8	28.2	4300	6.54 x 10 ⁻⁵	9.3	0.55
	18	3	90	120	125	130	50	4	70	M10 x1.5	8	15	5.04 x 10 ⁻⁴	30.8	28.2	4300	5.96 x 10 ⁻⁵	9.3	0.55
	24	3	105	150	125	130	50	4	70	M10 x1.5	8	15	5.22 x 10 ⁻⁴	30.8	28.2	4300	5.96 x 10 ⁻⁵	9.3	0.55
40	12	2	120	180	135	135	65	4	83	M12 x1.75	8	18	1.86 x 10 ⁻³	39	35.5	3300	1.65 x 10 ⁻⁴	11	0.92
	24	3	128	192	135	135	65	4	83	M12 x1.75	8	18	1.92 x 10 ⁻³	39	35.5	3300	1.58 x 10 ⁻⁴	11	0.92
	32	4	115	172	135	135	65	4	83	M12 x1.75	8	18	1.05 x 10 ⁻³	39	35.5	3300	1.53 x 10 ⁻⁴	11	0.92
45	12	2	190	285	170	180	75	5	105	M16 x2.0	8	24	3.52 x 10 ⁻³	46.6	41.3	2600	3.4 x 10 ⁻⁴	23.2	1.3
	24	4	170	255	170	180	75	5	105	M16 x2.0	8	24	3.59 x 10 ⁻³	46.6	41.3	2600	3.2 x 10 ⁻⁴	23.2	1.3
	48	6	120	180	170	180	75	5	105	M16 x2.0	8	24	2.99 x 10 ⁻³	46.6	41.3	2600	3.1 x 10 ⁻⁴	23.2	1.3
55	12	2	290	435	205	229	85	5	128	M20 x2.5	8	30	9.61 x 10 ⁻³	56.1	50.9	2100	7.21 x 10 ⁻⁴	44	1.92
	24	4	270	405	205	229	85	5	128	M20 x2.5	8	30	9.77 x 10 ⁻³	56.1	50.9	2100	6.86 x 10 ⁻⁴	44	1.92
	48	6	275	410	205	229	85	5	128	M20 x2.5	8	30	1.01 x 10 ⁻²	56.1	50.9	2100	6.51 x 10 ⁻⁴	44	1.92
65	24	4	340	500	240	250	95	5	150	M20 x2.5	8	30	2.16 x 10 ⁻²	68.8	63.7	1700	1.58 x 10 ⁻³	66.5	2.83
	36	6	310	465	240	250	95	5	150	M20 x2.5	8	30	1.22 x 10 ⁻²	68.8	63.7	1700	1.52 x 10 ⁻³	66.5	2.83
	54	6	310	455	240	250	95	5	150	M20 x2.5	8	30	1.28 x 10 ⁻²	68.8	63.7	1700	1.52 x 10 ⁻³	66.5	2.83
75	24	4	380	570	275	260	105	6	165	M20 x2.5	8	30	2.73 x 10 ⁻²	75.2	70.1	1600	2.27 x 10 ⁻³	87.4	3.45
	36	6	340	510	275	260	105	6	165	M20 x2.5	8	30	2.02 x 10 ⁻²	75.2	70.1	1600	2.17 x 10 ⁻³	87.4	3.45
	54	6	340	510	275	260	105	6	165	M20 x2.5	8	30	2.11 x 10 ⁻²	75.2	70.1	1600	2.17 x 10 ⁻³	87.4	3.45
90	24	4	530	795	315	310	120	8	200	M24 x3.0	10	35	4.72 x 10 ⁻²	90	85	1200	4.72 x 10 ⁻³	137	4.96
	36	6	520	780	315	310	120	8	200	M24 x3.0	10	35	4.8 x 10 ⁻²	90	85	1200	4.57 x 10 ⁻³	137	4.96
	54	6	615	920	315	310	120	8	200	M24 x3.0	10	35	5.01 x 10 ⁻²	90	85	1200	4.57 x 10 ⁻³	137	4.96
120	24	4	950	1425	420	400	150	8	250	M24 x3.0	12	50	3.98 x 10 ⁻¹	120	115	1000	1.52 x 10 ⁻²	310	8.82
	40	5	1200	1800	420	400	150	8	250	M24 x3.0	12	50	4.07 x 10 ⁻¹	120	115	1000	1.49 x 10 ⁻²	310	8.82
	54	6	1200	1800	420	400	150	8	250	M24 x3.0	12	50	4.13 x 10 ⁻¹	120	115	1000	1.48 x 10 ⁻²	310	8.82

How to order SPIRACON®

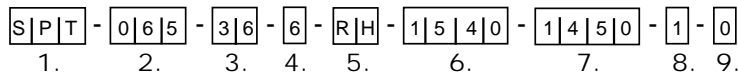
The product code:



- | | |
|---|---|
| <p>(1) Product
SPT - Spiracon® screw and nut
SPS - Spiracon® screw only
SPM - Spiracon® nut only</p> <p>(2) Model
Code taken from the technical chart on page 14</p> <p>(3) Lead
Code taken from the technical chart on page 14</p> <p>(4) Pitch
Code taken from the technical chart on page 14</p> <p>(5) Direction of thread
RH - Right hand
LH - Left hand</p> | <p>(6) Overall screw length
Code to represent the overall screw length in mm</p> <p>(7) Screw threaded length
Code to represent the threaded length of the screw in mm
i.e. stroke (travel) + B (nut length) + overtravel at each end</p> <p>(8) Number of Spiracon™ nuts
Code to represent the number of nuts required</p> <p>(9) Nut mounting holes
O - Standard mounting holes
S - To customer drawing</p> |
|---|---|

Spiracon® roller screws

Example part number:



- | | |
|---|--|
| <p>(1) Spiracon® screw and nut</p> <p>(2) Model 65</p> <p>(3) 36 mm lead</p> <p>(4) 6 mm pitch</p> <p>(5) Right hand thread</p> | <p>(6) 1540 mm overall screw length</p> <p>(7) 1450 mm screw threaded length</p> <p>(8) 1 Spiracon® nut</p> <p>(9) Standard nut mounting holes</p> |
|---|--|

Notes:

1. In all cases, the customer should supply a detailed drawing indicating the screw end matching details.
2. The above part number defines a standard catalog unit. Where a standard unit does not meet the customer's requirements, custom designed units are available.
3. All goods are sold subject to our standard terms and conditions of sale, a copy of which is available upon request.