



Creative Motion Control Planetary Roller Screws

DELIVERING INNOVATIVE LINEAR MOTION SOLUTIONS

PRODUCT CATALOG

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CREATIVE SOLUTIONS TO AUTOMATION'S MOST DEMANDING CHALLENGES



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We believe the information contained in this publication is accurate, but no liability can be accepted for any loss or damage whether direct, indirect or consequential arising out of the use of the information contained herein. Not approved for manned flight-critical applications without CMC consent.

Technical Information

Exceptional Value:

The CMC High Performance Roller Screw (PRS) Series provides a high force electromechanical solution to convert rotary motion into axial force, or vice versa.

CMC roller screws offer outstanding reliability and flexibility for the most demanding applications. CMC roller screw features include:

- Longer Life
- High efficiency, even with shallow leads
- Steep lead capacity
- Very high load capacities
- High rotational speed and acceleration
- Stiffness/shock tolerance

CMC Roller Screws are used in many industries, including:

- Presses
- Positioning systems
- Broaching and bending machines
- Custom machine tools
- Injection molding machines
- Military applications
- Factory Automation
- Lumber and steel industries
- Volumetric Filling
- Rescue tools



Total Cost of Ownership (TCO):

Actuators powered by CMC roller screws can replace most hydraulic and pneumatic system designs. Our customers have found the positive financial impact of this change to be immediate and dramatic.

While the hydraulic and pneumatic power plants run continuously, the EMA runs only as required. In addition, the EMA is dramatically more efficient. These benefits combine to create significantly lower power consumption with EMAs; the actuators often paying for themselves within a matter of months.

The EMA is also virtually maintenance free compared to the fluid leaks, filter changes, hose and coupling replacements, and power plant maintenance of hydraulic and pneumatic systems.

Environmental Impact:

With hydraulic systems, hazardous fluid leaks, filter changes, and air bleeds are a matter of course, and the environmental impact of this can be staggering. With an EMA solution employing the CMC PRS roller screw, these issues are all in the past. The positive environmental impacts are real and immediate. EMA systems have the added benefit of being much quieter.



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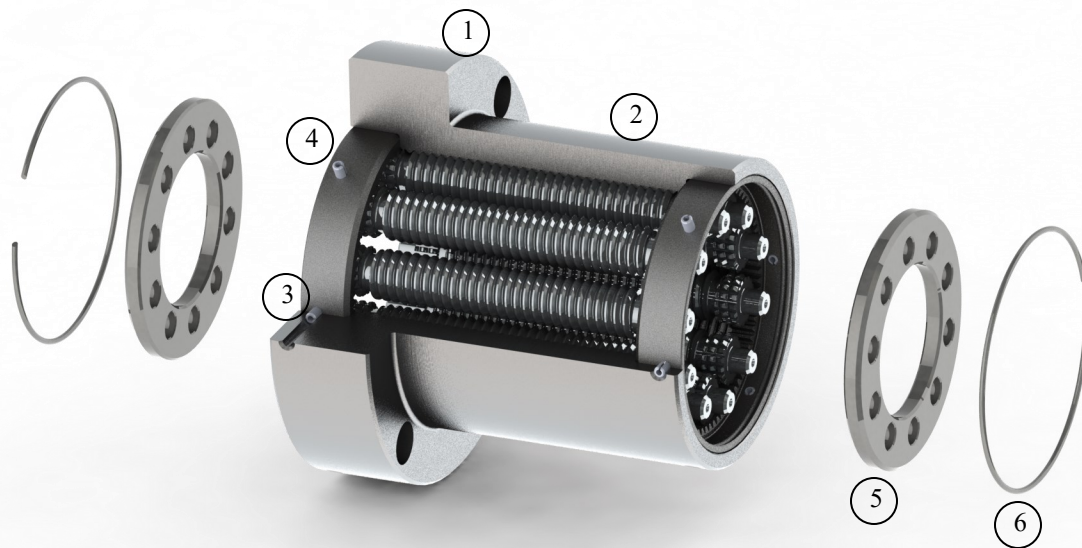
Technical Information

Design Elements:

CMC planetary roller screws utilize threaded rollers as rolling elements instead of bearing balls, as are used in ball screws. This provides a dramatically larger load transfer contact surface, which correlates to a much higher load capacity and longer life.

The lead angle of the nut and rollers are identical to prevent axial migration of the rollers.

This exploded view displays the basic planetary screw design system.



1. Roller nut
2. Rollers
3. Pins
4. Ring Gear
5. Spacer
6. Retaining Ring

Both screw shaft and nut have a thread profile with straight flanks and multi-start threads. The rollers have single start threads with a modified thread profile.

The rollers (2) have a spur gear and a cylindrical journal at each end. The ring gear (4) meshes with the rollers at each end of the unit. This prevents the rollers from skewing and keeps the axes parallel. Ring gears are timed during assembly and fixed in place with pins (3). Roller axes fit into the spacer (5). The spacer rotates and is held in the nut by a retaining ring (6).

Technical Information

Preload:

Due to the large number of contact points along with the high rigidity in the CMC roller screw design, most applications do not require internal preload to perform virtually backlash free.

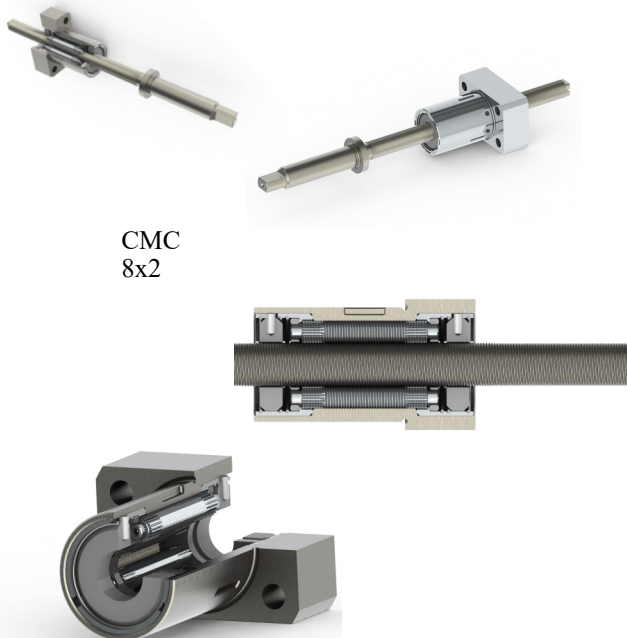
However, when required, preload can be achieved by providing a split-nut design. This design has the two nut halves pressed against each other so as to eliminate internal clearance.

The split nut design carries load on a reduced length of thread, and therefore load capacity is diminished with preload systems.

Materials:

CMC planetary roller screws are made only of exceptionally high quality materials.

- Rollers and nuts are manufactured from the highest grade tool and bearing steels, so as to provide even higher life and load capacities than comparable parts made of typical steels.
- All rolling elements are heat treated to not less than HRC 56.
- All materials can be modified to meet customer's specific requirements, with assistance from the CMC engineering team.



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The CMC Difference

Customization:

Our customers all have unique needs and requirements, and therefore they often require custom solutions. At CMC, we are not only able, but are also willing to help our customers with their custom requirements.

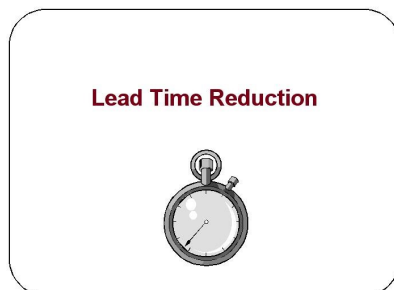
CMC can provide solutions for any custom requirement. We produce systems as large as 250mm, and as small as 5mm. We can produce any type of custom flange as needed. We are happy to work with you to ensure that you receive precisely the solution you need.

Engineering Assistance:

Our CMC engineering staff is standing by to help you with your roller screw questions.

Lead Times:

We know that time is of the essence, and we strive to provide all of our customers with the shortest lead times possible. We will communicate every step of the way so that there are never any surprises with delivery times.



Prototypes:

We welcome the chance to provide prototypes and have no minimum order. Of course, price breaks are substantial as you move into higher quantities.

Nonstandard Materials:

We are happy to work with your material requirements; our processes are flexible and can work to your requirements as long as the materials selected can sustain the required load.

US Made:

As we are a US company, all of our parts are made in the US to provide us with maximum control over all of our parts and processes. If you require or prefer 100% US made product, CMC is your logical solution. However, CMC roller screws are shipped all over the world each month.

Communication:

At CMC, we always remember that our customers are the only essential element to our business, and that satisfied customers require not just great parts delivered on time, but they also require personal time and attention.

Through both the sales and production cycles, you will have a personal single point contact that you can come to with questions at any time.



CREATIVE SOLUTIONS TO AUTOMATION'S MOST DEMANDING CHALLENGES



CMC Roller Screw Support Bearing

Unbeatable Combination of Force Density and Compact Design

With the incredible force density that the CMC Performance Roller Screw delivers, typically sized traditional bearing supports are inadequate to react the PRS thrust loads and, consequently, the required bearings become too large and too expensive to be practical for most high thrust applications. In order to relieve this problem and enable the full potential of the Performance Roller Screw, CMC has developed the patented Roller Screw Support Bearing (RSSB).

The RSSB eliminates the “bearing limited” condition that plagues many high force screw applications. By delivering dynamic capacity ratings that far exceed those of traditional angular contact ball bearings, the CMC RSSB affords tremendous life improvements, eliminating the constant bearing replacement that limits lesser support bearing technologies.

Further, because the size of the RSSB is manageable, shaft end features are able to be designed which allow overall costs to be reduced. Sleeves or costly end feature machining are completely avoided. The RSSB design, while delivering extreme load capacity, is significantly smaller than the competition. Finally, due to the geometry of the design, the CMC RSSB bearing family can be applied in a thrust, radial, or combination support for radial and axial load bearing configurations with equal advantage.

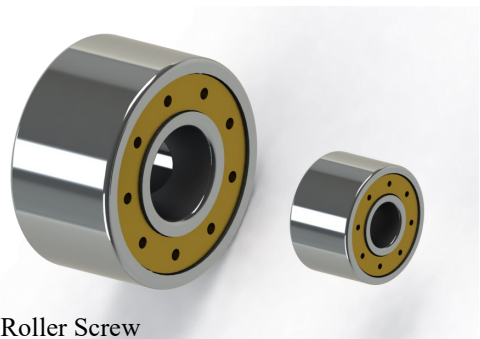
Contact CMC for more information on the Roller Screw Support Bearing!

Specifically designed to match the most common envelope dimensions of angular contact bearing duplex or quad pack sets.

In this way, the CMC RSSB can be an exact replacement for existing bearing options that may already be in use but require replacement. With new applications, however, the RSSB delivers a significant opportunity for size and weight reduction. By providing a smaller bearing, screw shaft complexity is simplified, overall system weight is optimized, and next higher assembly costs can be minimized.

RSSB Benefits:

- **Significantly larger loads** – loads are 2-5 times those of traditional ACBB’s due to the greater number of contact points
- **Increased life** –by virtue of the increase in dynamic load capacity, life increases by order of magnitude
- **Reduced waste** – less material wasted in machining equals cost reduction
- **Optimized geometry** – a single RSSB does the work of multiple competitive bearings
- **Standard sizes** – up to 320 mm OD



CMC Roller Screw Support Bearings

CREATIVE SOLUTIONS TO AUTOMATION’S MOST DEMANDING CHALLENGES



Calculation and Selection

Selection Process:

The data on the following pages is designed to assist you in selecting the proper screw size for your application. Please contact our Sales Engineering department for assistance, if required.

Basic Dynamic Load Ratings (C):

Dynamic load is used to calculate the fatigue life of a planetary roller screw. The dynamic load rating is defined as load, constant in magnitude and direction under which 90% of a statistically significant number of apparently identical planetary roller screws reach an operating life of 10^6 revolutions (L_{10}).

Static Load Ratings (C_0):

Static Load rating (C_0) is a load that causes permanent deformation at the most heavily loaded contact equal to .0001 of the curvature diameter of the rolling element.

Static Load Safety Factors (S_0):

In order to prevent deformations that could impair the proper function and the operating noise of the planetary roller screw, a safety factor (S_0) should be used when selecting a roller screw based on basis of its static load rating.

For operations with quasi-static load applications (such as presses) where load occurs primarily on the same portion of the stroke, it is recommended to use a higher S_0 .

Theoretical Life:

Theoretical life (L_{10} or L_h) is the operating time reached by 90% of a group of apparently identical planetary roller screws operating under the same conditions. Theoretical life is calculated as:

$$L_{10} = \left(\frac{C}{F_m} \right)^3 \quad \text{or} \quad C_{req} = F_m \cdot (L_{10})^{1/3}$$

Where :

L_{10} = Life (millions of shaft revolutions)

C = Dynamic load capacity (kN)

F_m = Cubic mean load (kN)

C_{req} = Required dynamic load capacity (kN)

Theoretical life, normally expressed in 10^6 revolutions, can be expressed in different operating units such as hours:

$$L_h = \frac{10^6 \cdot (C/F_m)}{n_{eq} \cdot 60}$$

Where :

L_h = Life (hrs)

n_{eq} = Screw equivalent rotational speed (rpm)



Calculation and Selection

Equivalent Load:

Operating Loads can be quantified by the incremental load and stroke characteristics that the system is subject to: masses, inertia, etc. For systems with varying conditions (changes of load magnitude, duration, and/or speed), a more complex calculation would be required. Please contact CMC sales engineering for more information on these types of applications.

The equivalent load is the calculated cubic mean operating load used for determining life. This is dependent on load pattern.

Equivalent cubic mean load can be calculated as:

$$F_m = \frac{(F_1^3 L_1 + F_2^3 L_2 + F_3^3 L_3 + \dots)^{1/3}}{(L_1 + L_2 + L_3 + \dots)^{1/3}}$$

Where:

F_1, F_2, F_3, F_n = Incremental force components of stroke (kN)

L_1, L_2, L_3, L_n = Incremental stroke components associated with each load (mm)



CMC 30x10



Calculation and Selection

Rigidity of Roller Screw:

The rigidity of a roller screw assembly is a function of many parameters, including: nut rigidity, bearing support rigidity, screw shaft rigidity, mounting housing rigidity, and mounting arrangement.

If known, all these parameters can be assembled in a formula as follows:

$$C_{\alpha} = \left(\frac{1}{C_{\delta s}} + \frac{1}{C_{\delta n}} + \frac{1}{C_{\delta b}} + \frac{1}{C_{\delta h}} \right)^{-1}$$

Where: (rigidity

in $(N/\mu m)$)

C_{α} = Total system rigidity

$C_{\delta s}$ = Screw shaft rigidity

$C_{\delta n}$ = Nut rigidity

$C_{\delta b}$ = Support bearing rigidity

$C_{\delta h}$ = Housing rigidity

The screw rigidity can be calculated as:

$$C_{\delta s} = 165 \cdot d_0 \cdot f_e$$

$C_{\delta s}$ = Rigidity of the screw

d_0 = Screw pitch diameter (mm)

f_e = Shaft stiffness factor

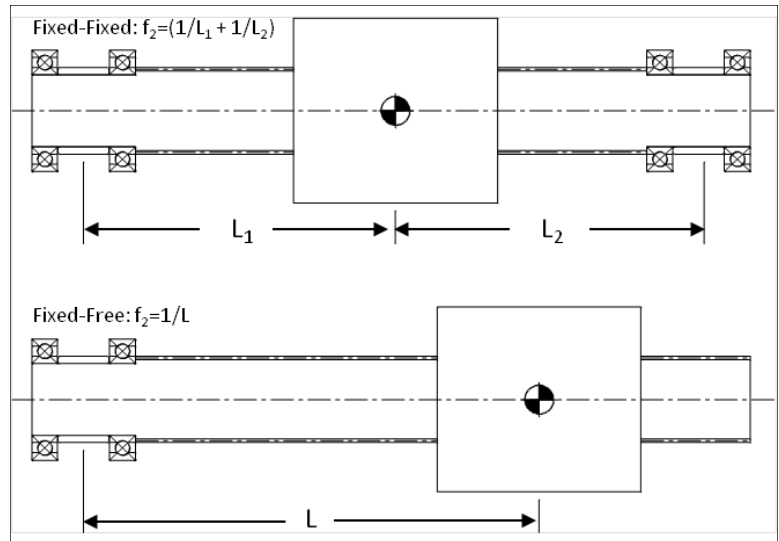
The nut rigidity can be calculated as follows:

$$C_{\delta n} = f_n \cdot (F_{ax})^{1/3}$$

F_{ax} = Applied load (N)

f_n = Nut stiffness factor (provided on request)

Rigidity F_e Factor



CMC 64x36 on 8 foot shaft

Calculation and Selection

Column Strength:

If the screw is subjected to compressive loads, a verification of its suitability to the loading conditions must be evaluated. The buckling capacity of the screw can be evaluated as follows:

$$F_c = \frac{34 \cdot f_3 \cdot d_2^4 \cdot 10^3}{L^2}$$

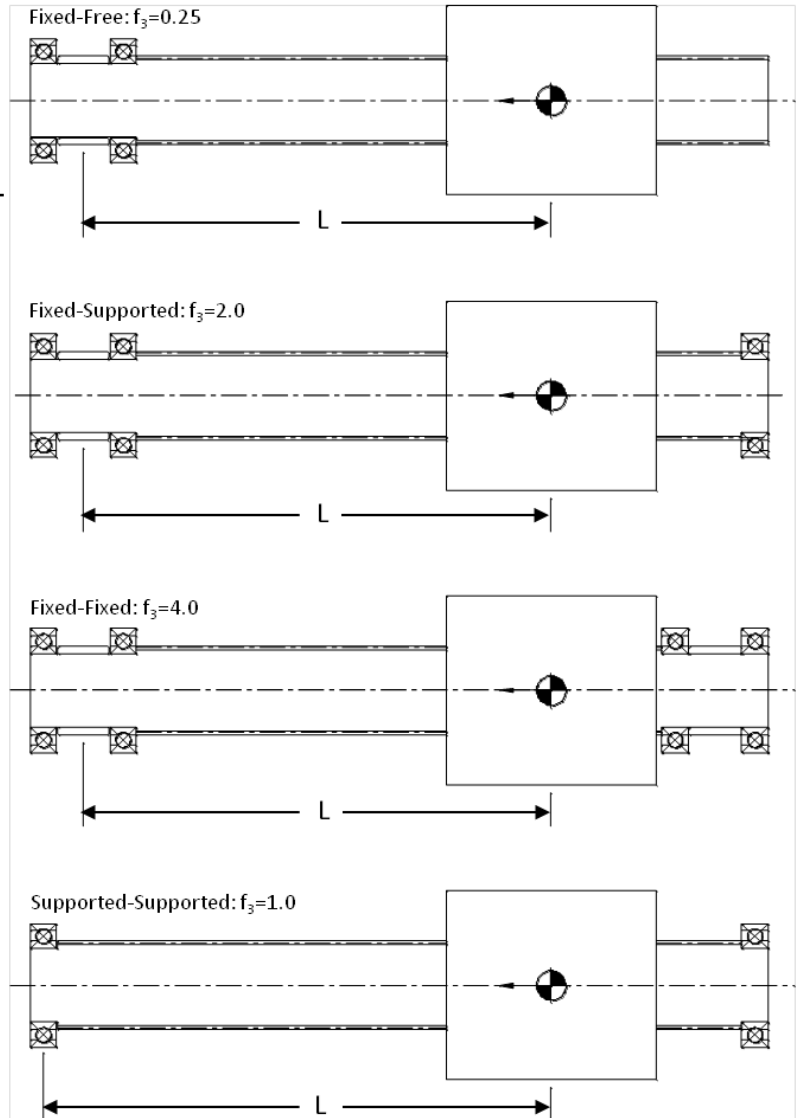
Where:

F_c = Buckling strength (N)

f_3 = shaft stiffness factor dependent on end condition (see table)

d_2 = screw shaft root diameter (mm)

L = free length (distance between support bearings)



Calculation and Selection

Critical Speed:

The maximum achievable rotational velocity of a CMC roller screw is affected by these parameters:

- Diameter and free length of the screw
- End support configuration
- Rotational Speed capability
- Rotating component (nut or screw)

The critical speed of the screw shaft is calculated as follows:

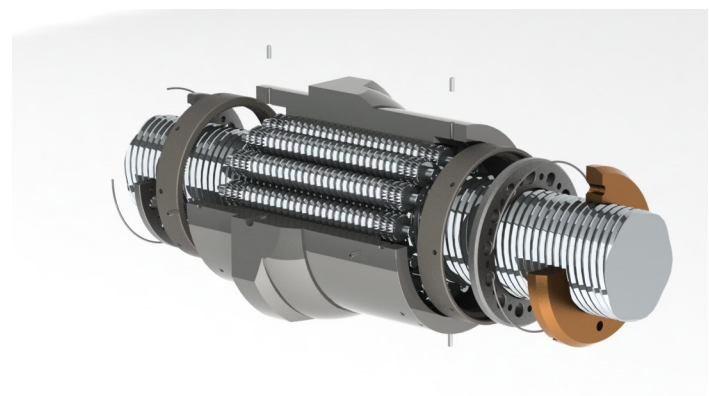
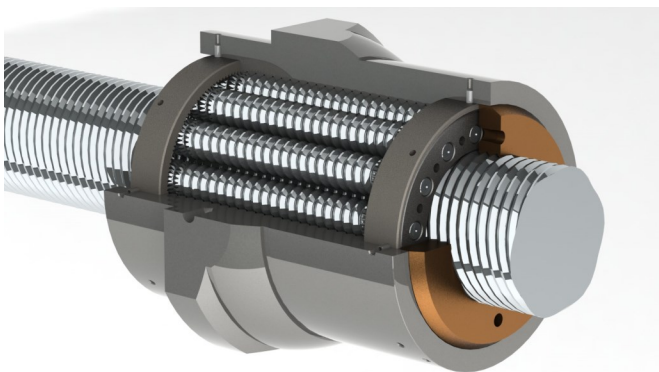
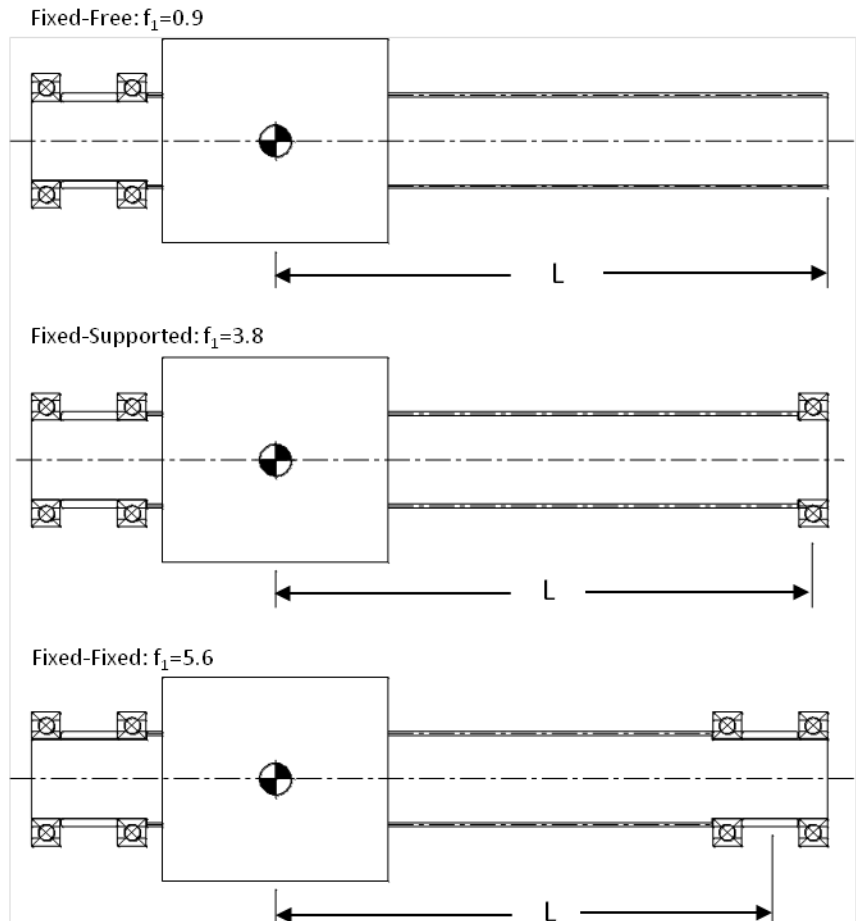
$$n_{cr} = \frac{f_1 \cdot d_1 \cdot 10^7}{L^2}$$

Where:

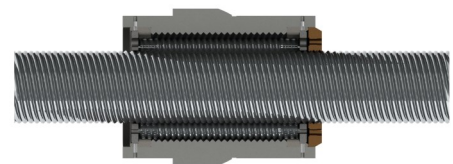
n_{cr} = Critical speed of screw shaft
(no safety factor) (*rpm*)

f_1 = End support stiffness factor

d_1 = Screw outside diameter (*mm*)



CMC
100x50



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Calculation and Selection

Efficiency and Driving Torque:

The efficiency of a planetary roller screw is dependent on its operating parameters. The friction of the system is dependent on many factors that can vary. The following calculation is a simplification of the screw selection process that can change based on variables.

$$\eta = \frac{1}{1 + \frac{\pi \cdot d_0 \cdot \mu}{P_h}}$$

$$\eta' = 2 - \frac{1}{\eta}$$

$$\eta_p = \eta \cdot 0.9$$

Where:

η = Theoretical direct efficiency:
converting shaft rotation into axial motion

η' = Theoretical indirect efficiency
(backdriving)

η_p = Practical efficiency: the value of 0.9 should be used as an average value

between the practical efficiency of a new screw and that of a normally run screw.

This is the value that should be used for all industry applications in all normal working conditions.

P_h = Lead of screw (mm)

d_0 = Pitch diameter of screw (mm)

μ = Coefficient of friction

Torque Required:

To move an axial load at constant speed the screw requires a motor torque and its magnitude can be calculated as:

$$T = \frac{F \cdot P_h}{2 \cdot \pi \cdot \eta_p \cdot 10^3}$$

Where:

T = Required input torque (Nm)

F = Axial load developed by screw (N)

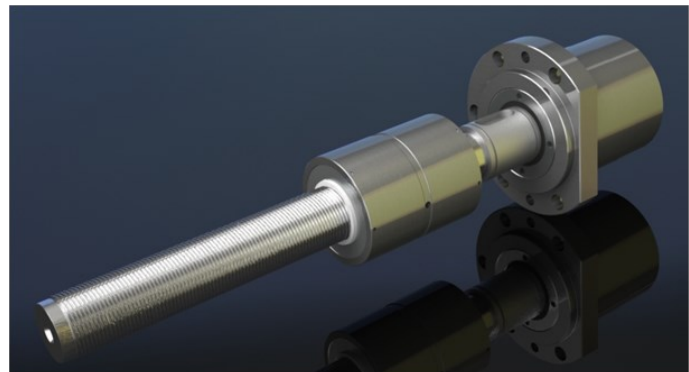
To restrain an axial load, the screw must be equipped with a brake. The restraining torque is calculated as:

$$T_B = \frac{F \cdot P_h \cdot \eta'}{2 \cdot \pi \cdot 10^3}$$

Where:

T_B = Required braking torque (Nm)

NOTE: start-up torque will be greater than the value T_B .



Lubrication

As a general rule, the same lubricants are used for planetary roller screws as for rolling element bearings: either oil or grease. The type of lubricant used is most dependent on the operating and maintenance conditions.

Lubrication:

Proper lubrication is essential to the proper functioning of a roller screw. The key point is in the initial lubrication of the nut so that all components have adequate lubrication.

Unless otherwise specified, CMC roller screws are shipped “dry” with only a protective coating, and the customer must properly lubricate the roller screw before usage.

The volume, spread, and frequency of re-application of the lubricant must be properly selected and monitored. At high speed the lubricant on the surface of the shaft may be thrown off by centrifugal forces. Therefore, it is important to monitor this effect when operating at high speed, and considering this when selecting a lubricant.

Monitoring the equilibrium temperature reached by the nut permits the frequency of re-lubrication or oil flow rates to be optimized.

The selection of lubricant and the maintenance of re-lubrication is the responsibility of the customer.



Oil Lubrication:

A centralized recirculating oil system is ideal due to its ability to continually supply filtered, temperature controlled oil at prescribed flow rates. While such systems represent the optimum, they are not always practical from a cost or size perspective and alternate solutions are available that can achieve effective results if properly configured.

Selection of Oil:

Circulating mineral oils with EP additives to enhance resistance to aging and corrosion in compliance with DIN 51517, Part 2, are particularly suitable for the lubrication of planetary roller screws. Operating speed, ambient temperature and operating temperature are all factors in determining the required viscosity of the lubricant.

The required volume of oil depends on the screw diameter, the number of supporting rollers and the amount of heat to dissipate.

For immersion lubrication, the oil level should be such that the lowest roller is completely submerged in oil. The amount of oil and the change interval depend on the intensity of the loading on the system and the details of the installation.

Figure A on the following page shows the operating viscosity, v_k (mm²/s), required for any given mean speed of the screw system based on the diameter of the shaft. The viscosity, v_k , prescribed by figure A, ensures a sufficient lubrication to achieve the nominal life for the system, provided that the lubricant is properly filtered and maintained. Intermediate values can be estimated by interpolation between the curves provided in figure A.

Lubrication

Figure A

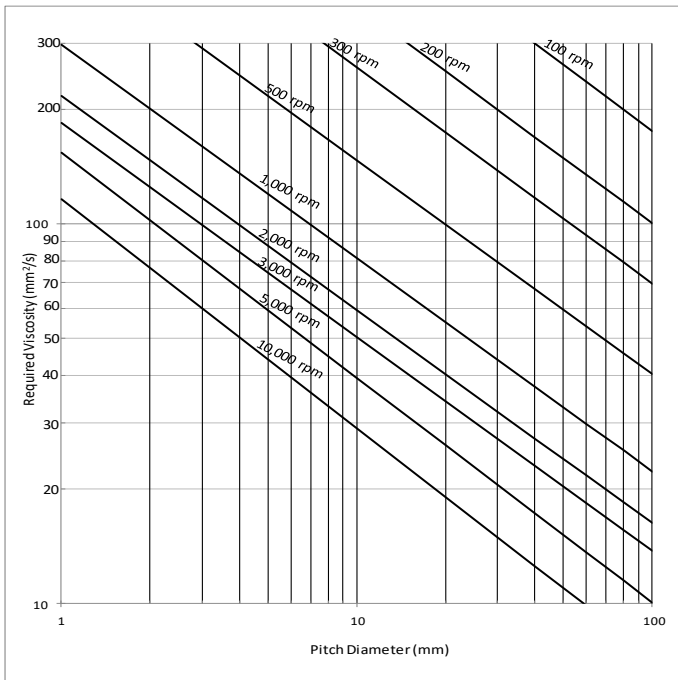
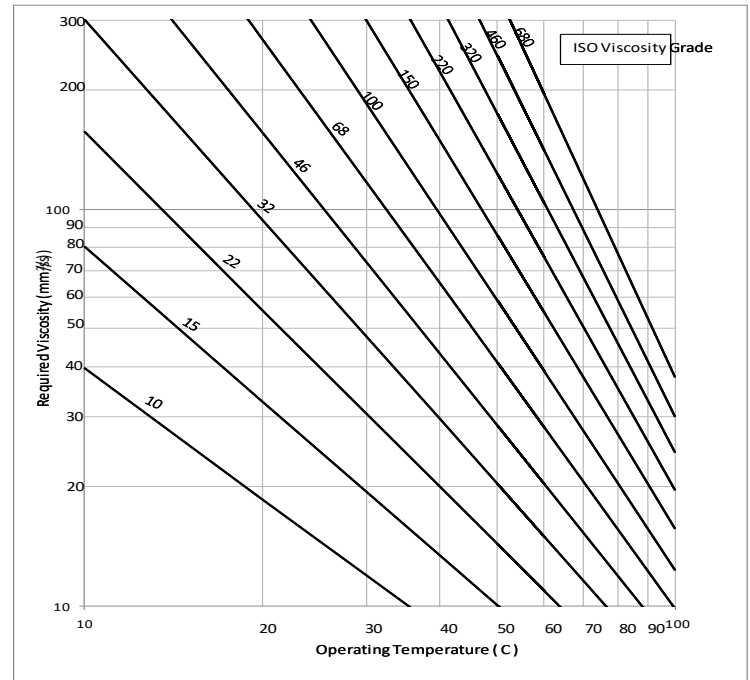


Figure B



Nominal lubricant viscosity can be determined based on the required viscosity, v_k , the steady state temperature of the roller screw using the viscosity-temperature diagram in figure B, and the operating temperature of the roller screw system. Nominal viscosity is the viscosity of the lubricant at 40°C. Viscosity classes consistent with ISO VG (DIN 51517), Part 2, are plotted in figure B.

The operating temperature of the roller screw must be known or estimated to calculate the required nominal viscosity using this technique.

Grease Lubrication:

Grease is the most common form of lubrication for CMC roller screws, and provides an effective solution for most applications.

The required viscosity in the case of grease lubrication can be calculated using the same process outlined above for oil viscosity determination. The viscosity of grease is rated with ISO VG levels just as oils and this information is typically provided by grease manufacturers.

Re-greasing intervals depend on the screw arrangement, size and operating conditions.

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Installation and Maintenance

Roller screw systems require little maintenance when compared to fluid power alternatives, such as hydraulic and pneumatic systems.

Storage

Roller screws are precision components and should be handled with care. Roller screws should be allowed to remain in their shipping crate or properly supported when stored.

CMC roller screws are shipped in sealed plastic, and the units should remain sealed until they are installed for use.

Lubrication

See section on lubrication for more information. Unless otherwise specified, CMC roller screw assemblies are delivered “dry”, with only rust-resistant coating. *This protective coating is not a lubricant.* The assemblies must be properly lubricated prior to installation.

Disassembly/Re-assembly

In some cases, the roller nut must be removed and re-installed on the shaft. In such cases, CMC can provide a custom-fit mandrel to ensure that internal integrity of the roller screw assembly is maintained at all times during the assembly and disassembly process.

Screw Shaft End Design

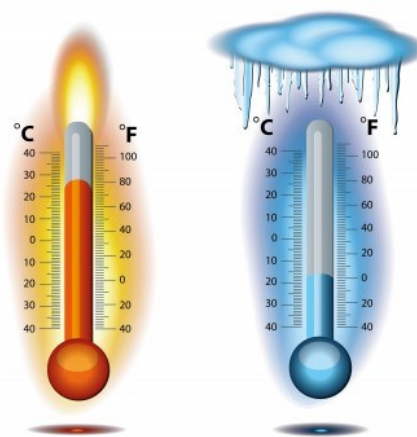
Structural integrity of custom end features of the shaft designed per the customer’s specifications are the responsibility of the customer.

Starting up the Screw

After the assembly has been cleaned, mounted, and lubricated, it is recommended that the nut makes several full strokes at low speed. This allows installation and verification of limit switches or any other mechanism unique to the assembly prior to applying full load and operating at full speed.

Operating Temperature

Screws made from standard steels and operating under normal loads can sustain temperature ranges from -20 degrees Celsius (-4 degrees Fahrenheit) to $+110$ degrees Celsius (230 degrees Fahrenheit). If your screw will be operating outside of these temperature ranges, contact CMC engineering.



Thermometer

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Accuracy/Availability Chart

Tolerance Classes

Planetary roller screws are divided into tolerance classes based on DIN 69051, Part 3 (ball screws). The key factor in determining tolerance class is screw lead error (V_{300P}) relative to a thread length of 300mm. The following table shows the tolerance classes:

Tolerance Class	V_{300P}
G1	6 $\mu\text{m}/300\text{mm}$
G3	12 $\mu\text{m}/300\text{mm}$
G5	23 $\mu\text{m}/300\text{mm}$
G9	200 $\mu\text{m}/1000\text{mm}$

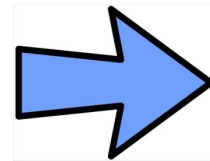
Positioning planetary roller screws are typically supplied in tolerance classes of G1, G3, and G5, and transport roller screws in G9.

Industry standard is G5, and CMC roller screws are to G5 tolerance unless otherwise specified.

Availability Chart

The chart on the following page shows the readily available CMC roller screw sizes. Please contact CMC for more information if you are interested in a size you do not see on the chart.

On the following pages is a table that provides dynamic and static load capacities and size details for some of our available sizes. *This is a sample table only*; all sizes on the chart on the following page are available, whether or not they are included in the sample size table.



Size Availability Chart

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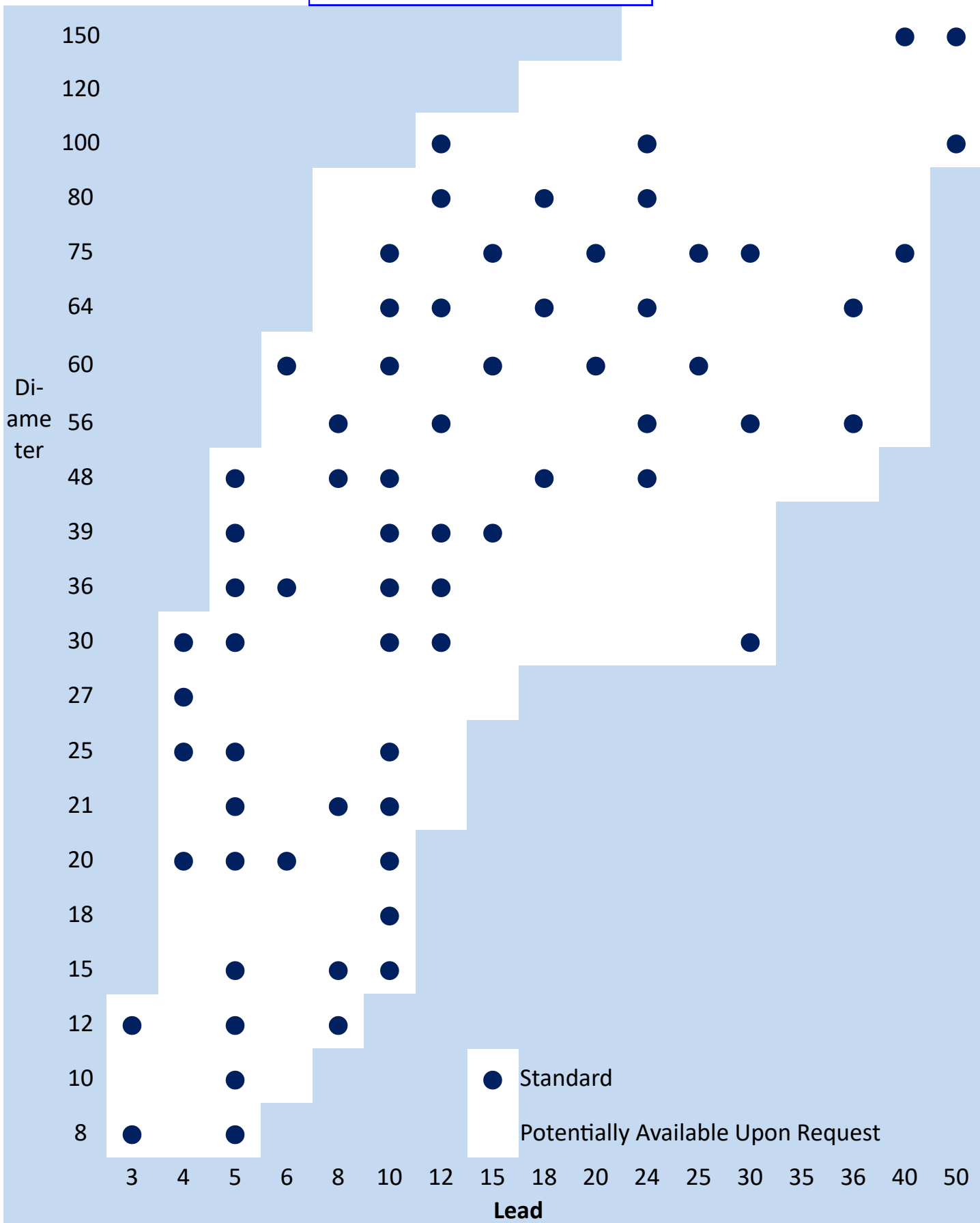
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Size Availability Chart



CMC High Performance Roller Screw

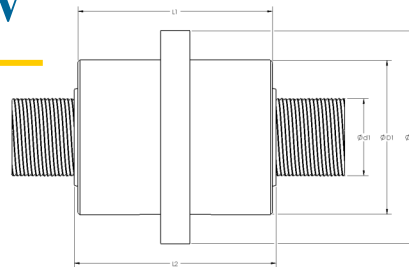
d_1 = Shaft OD

D_1 = Cylindrical nut OD

D_2 = Nut flange OD

L_1 = Nut length - no wipers

L_2 = Nut length - with wipers



Diameter x Pitch	d1 (mm)	Efficiency	Single nut with backlash		D1 (mm)	D2 (mm)	L1 (mm)	L2 (mm)
			C (kN)	Co (kN)				
8x3	8.2	92.00%	8.9	18.2	21	41	31	41
8x5	8.4	92.70%	7.3	14.8	21	41	31	41
12x3	12.1	91.50%	28.2	58.1	30	48	44	54
12x5	12.3	92.20%	26	54.9	30	48	44	54
15x5	15.3	91.70%	35	73.8	34	56	50	60
15x10	15.5	91.30%	31.6	65.8	34	56	50	60
21x5	21.3	90.40%	71.3	150.5	45	68	54	64
21x10	21.6	92.60%	70.3	148.4	45	68	54	64
25x4	24.2	88.20%	118.3	249.8	53	84	78	88
25x5	24.3	89.70%	112.5	237.4	53	84	78	88
25x10	24.6	92.20%	108.6	229.3	53	84	78	88
30x5	30.3	88.20%	133.6	281.99	62	92	85	99
30x12	30.8	92.10%	130.8	278.1	62	92	85	99
30x20	31.2	92.70%	129.4	273.3	62	92	85	99
36x12	36.7	91.70%	122.3	258.2	74	106	80	92
39x5	39.3	86.10%	170.8	360.5	80	116	100	114
39x10	39.6	90.80%	160.9	339.7	80	116	100	114
39x12	39.7	91.40%	168	354.6	80	116	100	114
39x15	39.9	92.60%	170.1	358.2	80	116	100	114
48x5	48.3	84.50%	258.9	546.6	100	150	127	141
48x8	48.5	88.20%	237.8	501.9	100	150	127	141
48x10	48.6	89.70%	221	466.6	100	150	127	141
48x18	49.1	92.00%	267.8	565.3	100	150	127	141

NOTE: This is a sampling of sizes only. If you do not see the size you need on this table (continued on following page), contact CMC Sales Engineering for assistance.

We believe the information contained in this publication is accurate, but no liability can be accepted for any loss or damage whether direct, indirect or consequential arising out of the use of the information contained herein. Not approved for manned flight-critical applications without CMC consent.

CMC High Performance Roller Screw

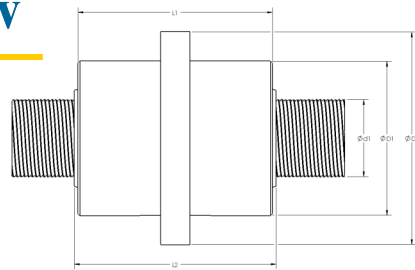
d_1 =Shaft OD

D_1 =Cylindrical nut OD

D_2 =Nut flange OD

L_1 =Nut length - no wipers

L_2 =Nut length - with wipers



Diameter x Pitch	d1 (mm)	Efficiency	Single nut with backlash		D1 (mm)	D2 (mm)	L1 (mm)	L2 (mm)
			C (kN)	Co (kN)				
48x24	49.4	92.70%	300.8	365.0	100	150	127	141
56x12	56.7	89.90%	458.4	967.7	122	162	166	180
56x30	57.5	92.70%	602.9	1,304.8	122	162	166	180
60x15	60.9	90.60%	448.7	947.3	122	162	166	180
60x20	61.2	91.70%	489.9	1,034.1	122	162	166	180
60x25	61.5	92.20%	523.1	1,104.3	122	162	166	180
60x30	61.8	92.70%	543.3	1,147.0	122	162	166	180
64x12	64.8	89.10%	388.2	830.5	115	180	129	147
64x18	64.9	91.10%	432.0	935.0	115	180	129	147
64x24	65.2	92.00%	468.7	1,014.5	115	180	129	147
75x10	75.6	86.40%	663.5	1,890.2	150	195	191	209
75x20	76.2	90.90%	754.7	1,948.1	150	195	191	209
75x40	77.4	92.70%	665.2	1,975.3	150	195	191	209
80x12	80.6	87.20%	644.8	1,395.5	138	180	156	174
80x18	80.9	90.10%	729.2	1,578.2	138	180	156	174
80x24	81.2	91.30%	772.9	1,672.7	138	180	156	174
80x36	81.8	92.40%	813.1	1,759.8	138	180	156	174
100x12	100.6	85.60%	1,130.2	4,222.2	200	245	260	281
100x20	100.2	89.50%	1,427.9	4,125.5	200	245	260	281
100x35	101.1	91.80%	1,377.2	4,360.1	200	245	260	281
100x50	102	92.70%	896.5	4,328.9	200	245	260	281
120x20	121.2	88.16%	1,604.0	6,258.5	240	295	330	355
120x35	121.2	89.81%	1,645.3	7,003.2	240	295	330	355
150x40	151.8	88.20%	2,191.6	9,499.8	320	385	412	437
150x50	151.8	89.50%	2,208.1	9,465.4	320	385	412	437

NOTE: This is a sampling of sizes only. If you do not see the size you need on this table (continued on previous page), contact CMC Sales Engineering for assistance.





CREATIVE MOTION CONTROL, INC.
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Roller Screw Application Configuration Worksheet

Company Name _____ Contact _____

Load & Life Requirements

Extension Max Load	_____	lbf, kN	* provide complete
Extension Mean Load	_____	lbf, kN	load/stroke profile
Retraction Max Load	_____	lbf, kN	if available
Retraction Mean Load	_____	lbf, kN	
Static Load Max	_____	lbf, kN	
Cycle Rate	_____	cycles per min, hour, day	
Operating Hours per Day	_____		
Operating Days per Week	_____		
Life Requirement	_____	total # cycles, # days, # years	

Stroke & Speed Requirements

Maximum Stroke	_____	inches,mm, revs
Maximum Speed	_____	inches,mm, revs per second
Minimum Speed	_____	inches,mm, revs per second
Positional Accuracy Req'd	_____	inches,mm

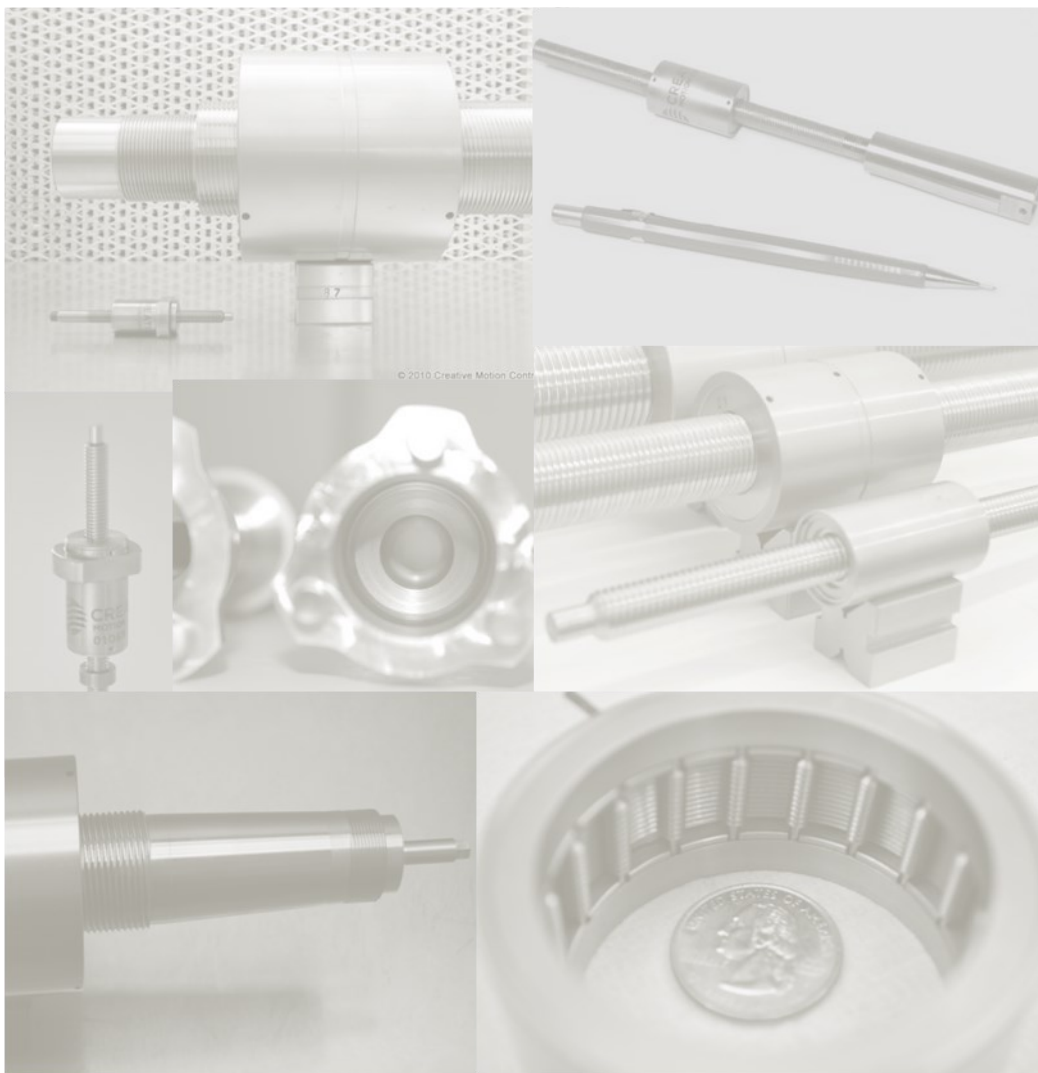
(standard backlash for 50mm RS is .03mm, 51 to 80: .04mm, 81 to 120: .05mm)

Feature Requirements

Flange?	_____	yes or no
Keyway?	_____	yes or no
Wipers?	_____	yes or no
Special Nut Size or Features?	_____	yes (describe) or no
Include CMC Thrust Bearing?	_____	yes or no

Innovation. Ingenuity. Performance.™

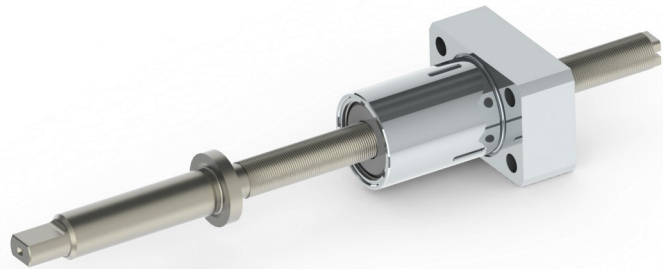
Please fill in and fax (866-883-0810) or e-mail (Sales@creativemotioncontrol.com) to be contacted by a CMC sales engineer.



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