



- High Repeatability
- High accuracy
- Short Lead times
- Fast Prototyping



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Merchant Drive Hertford England

## High Precision Lead Screws

*An Altra Industrial Motion Company*

## Offering smooth, precise, cost effective positioning, lead screws are the ideal solution for your application.

Thomson Neff precision lead screws from Huco Dynatork are an excellent economical solution for your linear motion requirements. For more than 25 years, Thomson has designed and manufactured the highest quality lead screw assemblies in the industry. Our precision rolling process ensures accurate positioning to  $.075\text{mm}/300\text{mm}$  and our PTFE coating process produces assemblies that have less drag torque and last longer.

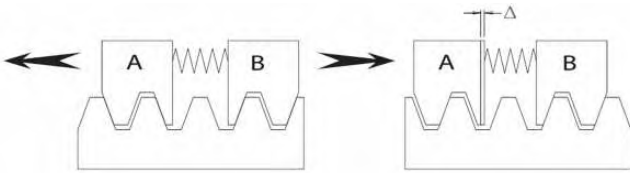
Huco Dynatork provides a large array of standard plastic nut assemblies in anti-backlash or standard Supernut® designs. All of our standard plastic nut assemblies use an internally lubricated Acetal providing excellent lubricity and wear resistance with or without additional lubrication. With the introduction of our new unique patented zero backlash designs, Huco Dynatork provides assemblies with high axial stiffness, zero backlash and the absolute minimum drag torque to reduce motor requirements. These designs produce products that cost less, perform better and last longer. Both designs automatically adjust for wear ensuring zero backlash for the life of the nut.

Huco Dynatork also provides engineering design services to aid in your design requirements producing a lead screw assembly to your specifications. Call Huco Dynatork today on **01992 501900** to discuss your application with one of our experienced application engineers

### Huco Dynatork Products

#### Deliver Performance

To ensure precise positioning, the elimination of backlash is of primary concern. Several types of anti-backlash mechanisms are common in the market which utilise compliant pre-



loads.

Because they are low in stiffness, a high preload is required to maintain position. This results in high drag torque, shorter life and poor performance. System costs increase as a larger motor is required.

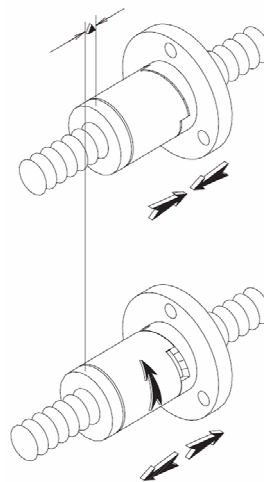
#### The Solution is available...

With the introduction of the Patented XC series nut with **ActiveCAM**, the highest axial stiffness with the absolute minimum drag torque is achieved. Utilising an extremely rigid stainless steel cam for biasing, axial stiffness is unsurpassed.

Axial play is removed without the need for high preload, resulting in the lowest drag torque possible.

#### Self-Compensating

As wear occurs over time, the unique **ActiveCAM** mechanism automatically compensates without compromising stiffness, positional accuracy or affecting drag torque at any time.



## Precision Lead Screws & Supernuts®

### Features/Advantages

#### Low Cost

Considerable savings when compared to ball screw assemblies.

#### Variety

Large range of leads and diameters to match your requirements.

#### Lubrication

Internally lubricated plastic nuts will operate without additional lubrication. However, TriGEL grease or dry film lubricant is recommended and will extend product life. See pages 13 and 14.

#### Vibration and Noise

No ball recirculation vibration and often less audible noise compared to ball screws.

### Design Considerations

#### Load

Supernuts provide a cost effective solution for moderate to light loads. For vertical applications, anti-backlash supernuts should be mounted with thread/flange on the bottom.

#### Cantilevered Loads

Cantilevered loads that might cause a moment on the nut will cause premature failure.

#### Critical Speed

Refer to critical speed chart on page 6.

#### Column Loading

Refer to column loading chart on page 7.

#### Self-Locking

Lead screws can be self locking at low leads. Generally, the lead of the screw should be more than 1/3 of the diameter to satisfactorily backdrive.

### Custom Capability

Option of custom components to fit into your design envelope.

#### Non-Corrosive\*

Stainless Steel and internally lubricated acetal.

#### Environment

Less susceptible to particulate contamination compared to ball screws.

#### Lightweight

Less mass to move.

#### Temperature

Ambient and friction generated heat are the primary causes of premature plastic nut failure. Observe the temperature limits below and discuss your design with our application engineers for continuous duty, high load and high speed applications.

Huco Dynatork recommends bronze nuts for very high temperature environments or can aid in your selection of high temperature plastic for a custom assembly.

#### Efficiency

Except at very high leads, efficiency increases as lead increases. Although the internally lubricated acetal provides excellent lubricity, Ball Screw Assemblies remain significantly more efficient than most Lead Screw designs. See page 12 for actual efficiencies.

#### Length Limitations

**Screw Diameter Max Length** 10 mm 1200 mm 12 - 16 mm 1800 mm >16 mm 3600 mm

#### Lead Accuracy

Standard Grade (SRA) 250 µm/300 mm

Precision Grade (SPR) 75 µm/300 mm

### Useful Formulas for Lead Screw Assemblies

#### TORQUE, ROTARY TO LINEAR

Driving the screw to translate the nut, or driving the nut to translate the screw.

$$\frac{\text{Torque} = \text{Load (N)} \times \text{Lead (mm)}}{(\text{N-mm}) 2\pi \times \text{efficiency}}$$

#### TORQUE, LINEAR TO ROTARY

Loading the nut to rotate the screw As a rule, assemblies that have an efficiency of 50% or more will backdrive.

See page 12 for efficiencies. Efficiencies listed in catalogue computed at 0,1 friction coefficient.

$$\frac{\% \text{ Efficiency} = \tan(\text{helix angle}) \times 100}{\tan(\text{helix angle} + \arctan f)}$$

f = coefficient of friction

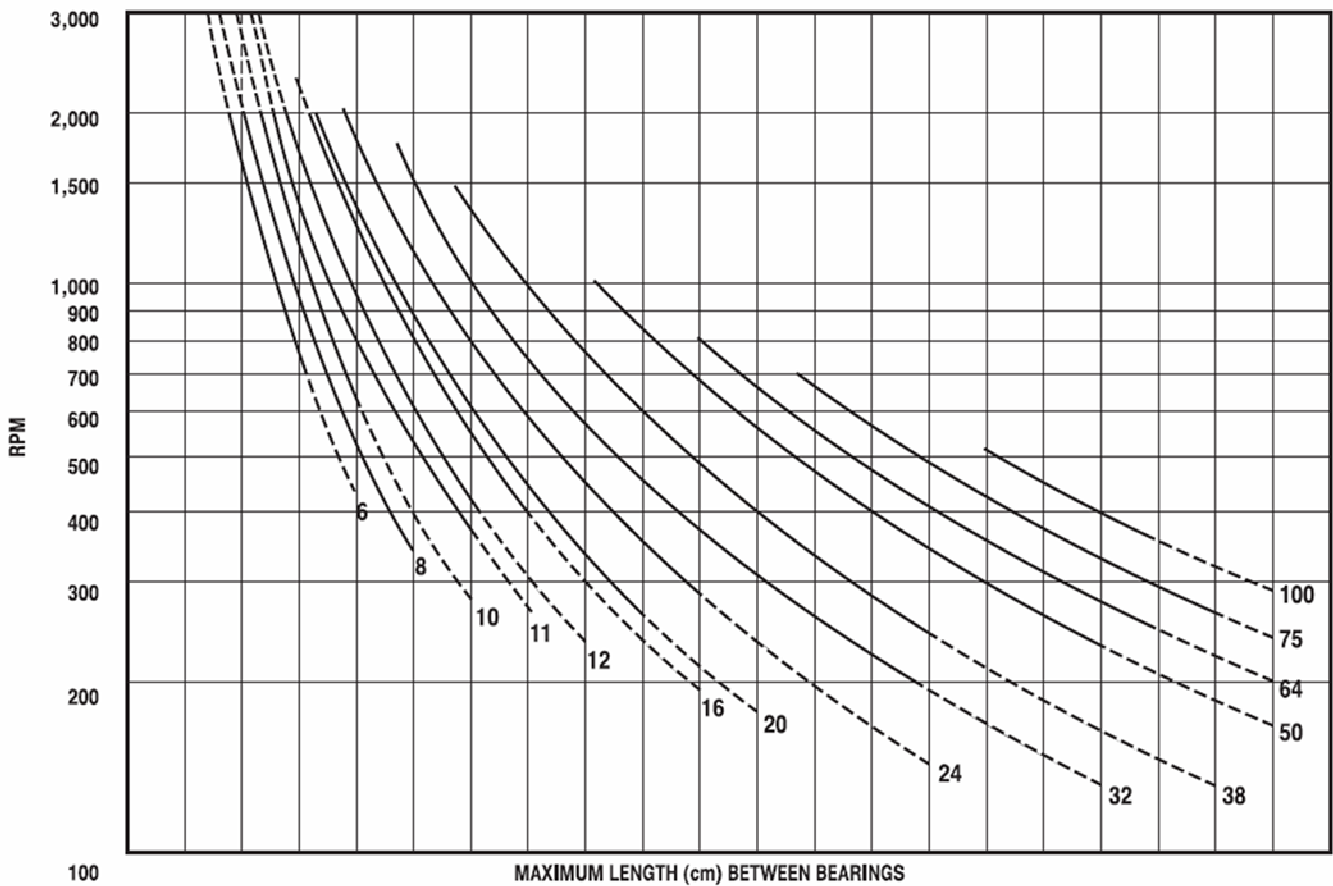
#### EFFICIENCY

$$\frac{\text{Torque} = \text{Load} \times \text{Lead} \times \text{Efficiency}}{2\pi}$$

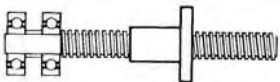
## Critical Speed Limits Chart

Every screw shaft has a rotational speed limit. That is the point at which the rotational speed sets up excessive vibration. This critical point is modified by the type of end bearing support used. To use this chart, determine the required RPM and the maximum length between bearing supports. Next, select one of the four types of end support shown below. The critical speed limit can be found by locating the point at which the RPM (horizontal lines) intersects with the unsupported screw length (vertical lines) as modified by the type of supports select below. We recommend operating at no more than 80% of the critical speed limit.

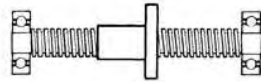
**Warning:** Curves for the screw diameters shown are based on the smallest root (minor) diameter of the standard screws within the nominal size range and truncated at the maximum ball nut rotational speed. **DO NOT EXCEED** this RPM regardless of screw length.



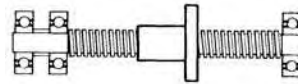
	15	30	46	61	76	91	107	122	137	152	168	183	198	213	229	244	259	274	305	320	
(A) Fixed-Free																					
(B) Simple-Simple	25	51	76	102	127	152	178	203	229	254	279	305	330	356	381	406	432	457	483	508	
(C) Fixed-Simple	30	61	91	122	155	185	216	246	277	307	338	391	401	432	462	493	523	554	584	615	
(D) Fixed-Fixed	38	76	114	152	191	229	267	302	340	378	417	455	493	531	569	607	645	683	721	757	



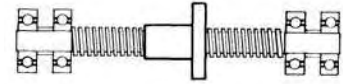
A Fixed—Free



B Simple—Simple



C Fixed—Simple



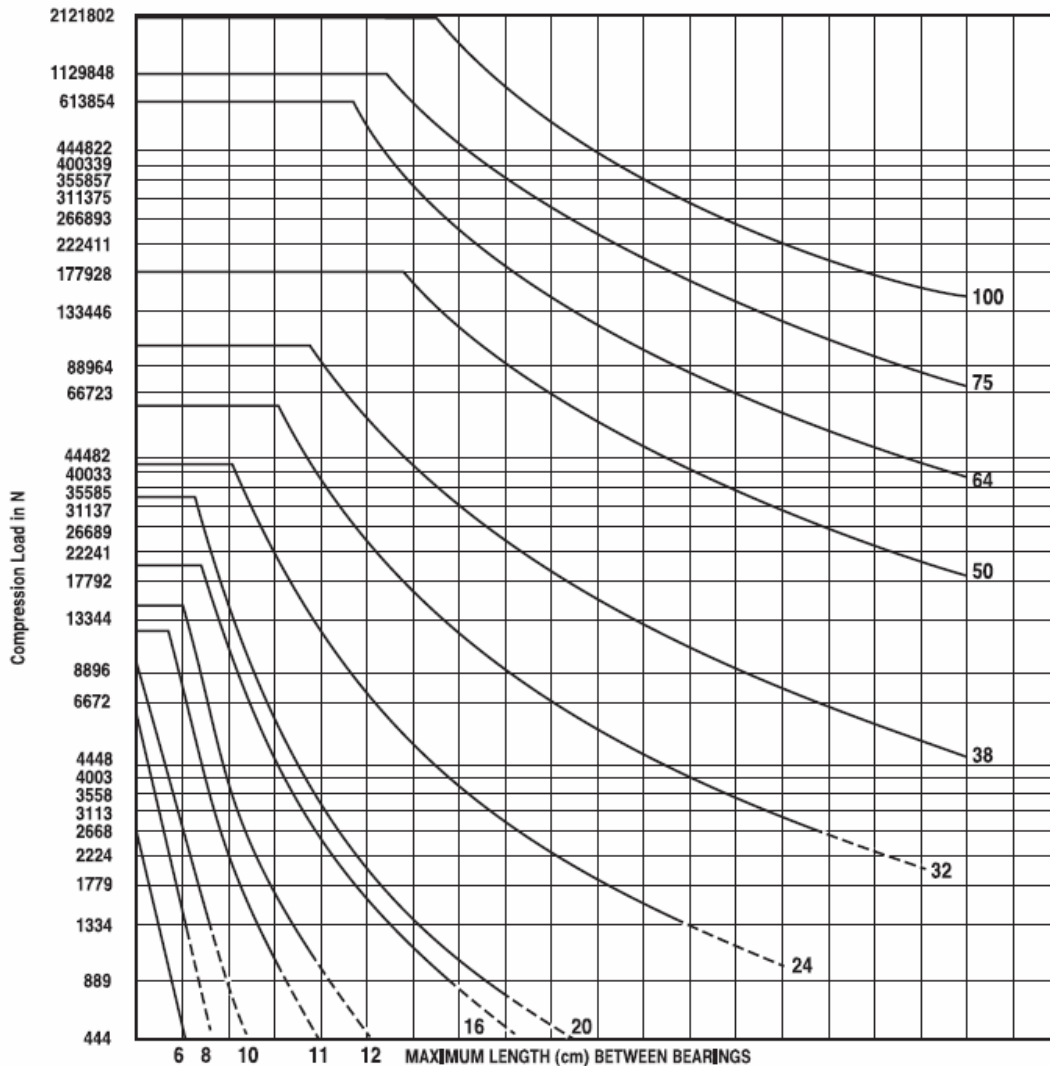
D Fixed—Fixed



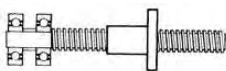
## Column Loading Capacities Chart

Use the chart below to determine the Maximum Compression Load for Screw Shaft. Usually, screws operated in tension can handle loads up to the rated capacity of the nut, providing the screw length is within standard lengths. End supports have an effect on the load capacity of screws. The four standard variations are shown below with corresponding rating adjustments. Find the point of intersecting lines of load (horizontal) and length (vertical) to determine the minimum safe diameter of screw. If loads fall into dotted lines, consult factory.

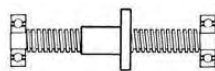
**Warning: DO NOT EXCEED nut capacity. Curves for the screw diameters shown are based on the smallest root (minor) diameter of the standard**



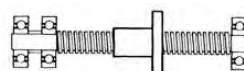
(A) Fixed Free	13	25	38	51	64	76	89	102	114	127	140	152	165	178	191	203	216	229	241
(B) Simple Simple	25	51	76	102	127	152	178	203	229	254	279	305	330	356	381	406	432	457	483
(C) Fixed Simple	36	71	107	145	180	216	251	287	323	358	396	432	467	503	538	574	610	648	686
(D) Fixed Fixed	51	102	152	203	254	305	356	406	457	508	559	610	660	711	762	813	864	914	965



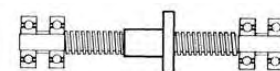
(A) Fixed-Free



(B) Simple-Simple



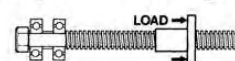
(C) Fixed-Simple



(D) Fixed-Fixed



Compression (Column) Load



Tension (Pulling) Load

## Lead Screw Product Summary

Series	Precision Lead Screw
Lead Accuracy	Standard Precision 250 µm / 300 mm High Precision 75 µm / 300 mm
Standard diameters	3.175 mm to 24 mm
Standard leads	1 mm to 45mm
Backlash	Zero - with anti-backlash nuts .02 to .25 mm with plain nuts
Dynamic Load	up to 1550 N
Max Static Load	up to 6675 N
Catalogue Pages	7 to 9

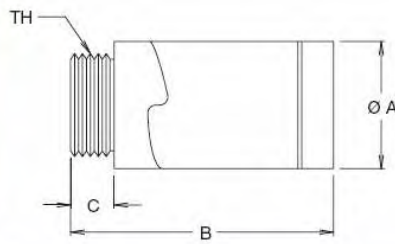
## Available leads

Metric	Lead (mm)													
	2	3	4	5	6	8	10	12	15	16	20	25	35	45
Dia (mm)	10	•	•	•	•	•	•	•			•		•	
12		•	•	•	•		•		•			•		•
16			•	•		•				•		•	•	
20			•			•		•		•	•			•
24				•										

Inch	Lead (in)													
	0.050	0.063	0.083	0.100	0.125	0.167	0.200	0.250	0.375	0.500	0.800	1.000	1.200	2.000
Dia (in)	1/8	•			•									
1/4	•				•			•		•				
3/8	•	•	•	•	•	•	•	•	•	•		•	•	
7/16					•			•		•				
1/2	•	•		•		•	•	•		•	•	•		
5/8				•	•		•	•		•				
3/4				•	•	•	•			•		•		•
1				•	•		•	•		•		•		

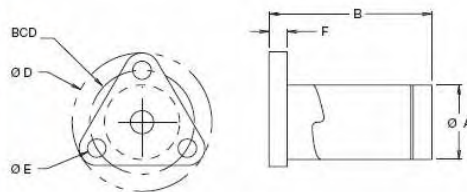
**Note:** Other non-standard leads are available—please ask your Huco Dynatork representative

## XC Series—The Performance Leader

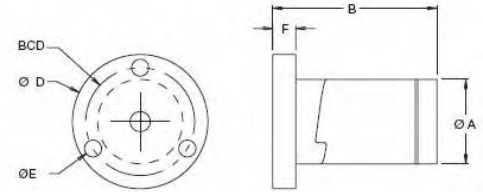


**Threaded Nut Type**

Model #	Screw Series (mm)	Also Use w/Series (inch)	Dimensions				Design Load (N)	Drag Torque	
			A (mm)	B (mm) max	C (mm)	TH (mm)		Minimum (N-mm)	Maximum (N-mm)
XCB3700	10	5/16, 3/8	20,8	47,6	6,4	M16 x 1,5	100	7	21
XCB5000	12	7/16, 1/2	28,4	57,2	9,5	M25 x 1,5	550	7	21
XCB6200	16	5/8	35,6	66,0	12,7	M30 x 1,5	775	14	42
XCB7500	20	3/4	41,4	73,7	12,7	M35 x 1,5	1100	21	71
XCB10000	24	1	47,8	76,2	15,2	M40 x 1,5	1550	35	71



XCF3700 size only

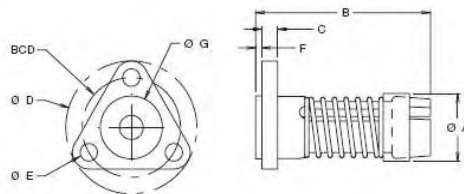


XCF5000, XCF6200

**Flange Nut Type**

Model #	Screw Series (mm)	Also Use w/Series (inch)	Dimensions						Design Load (N)	Drag Torque	
			A (mm)	B (mm) max	D (mm)	E (mm)	F (mm)	BCD (mm)		Minimum (N-mm)	Maximum (N-mm)
XCF3700	10	5/16, 3/8	20,8	47,6	38,1	5,1	5,1	28,6	100	7	21
XCF5000	12	7/16, 1/2	28,4	57,2	44,5	5,6	7,6	35,5	550	7	21
XCF6200	16	5/8	35,6	66,0	54,1	5,6	12,7	42,9	775	14	42

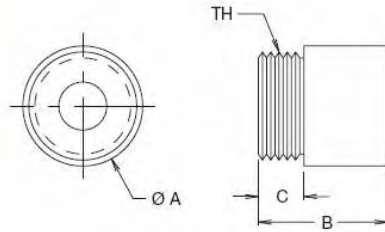
## AFT3700



**Flange Nut Type**

Model #	Screw Series (mm)	Also Use w/Series (inch)	Dimensions								Design Load (N)	Drag Torque	
			A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)	G (mm)	BCD (mm)		Minimum (N-mm)	Maximum (N-mm)
AFT3700	10	3/8, 7/16	19,6	50,8	5,1	38,1	5,1	1,5	18,0	28,6	45	14	35

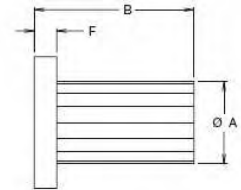
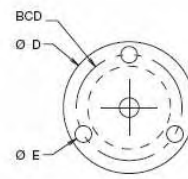
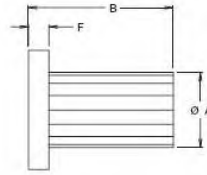
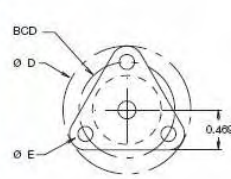
## SB Series—Compact Thread Mount Style



Threaded Nut Type

Model #	Screw Series (mm)	Also Use w/Series (inch)	Dimensions				Design Load (N)	Max Static Load (N)	Drag Torque
			A (mm)	B (mm)	C (mm)	TH (mm)			
SB3700	10	5/16, 3/8	19,1	19,1	6,4	M16 x 1,5	310	1550	No Preload
SB5000	12, 16	7/16, 1/2	25,4	25,4	9,5	M22 x 1,5	445	2225	
SB1000	20, 24	3/4, 1	38,1	38,1	12,7	M35 x 1,5	1335	6675	

## MTS Series—Easy Mount Flange Style



Flange Nut Type

MTS3700 only

MTS5000, MTS6200, MTS7500

Model #	Screw Series (mm)	Also Use w/Series (inch)	Dimensions						Design Load (N)	Drag Torque
			A (mm)	B (mm)	D (mm)	E (mm)	F (mm)	BCD (mm)		
MTS3700	10	3/8, 7/16	18,0	38,1	38,1	5,1	5,1	28,6	325	No Preload
MTS5000	12	1/2	19,1	38,1	38,1	5,1	6,4	28,6	550	
MTS6200	16	5/8	22,4	41,4	38,1	5,1	7,6	30,2	775	
MTS7500	20	3/4	28,6	44,5	50,8	5,1	7,6	36,5	1200	

**Note:** Design load is the recommended maximum operating load with lubrication at room temperature, 50% duty cycle, and 500 RPM. Increasing the RPM will decrease the maximum allowable operating load. At 1,000 RPM, the operating load is approximately 1/2 of the rated design load.



Precision rolled lead screws offer a burnished finish for maximum efficiency and lowest wear. All screws are stainless steel to provide corrosion resistance and a bright finish. SPT and SRT screws conform to DIN 103 while SPR and SRA screws have optimised thread forms for maximum performance.



Shaft Diameter (mm)	Lead (mm)	Part Number			Root Diameter (mm)	Efficiency @.1 Friction Coefficient (%)
		Precision Accuracy Prefix	Standard Accuracy Prefix	Size		
10	2*	SPT	SRT	10 x 2M	7,4	42
	3^	SPT	SRT	10 x 3M	6,4	53
	5	SPR	SRA	2-10 x 2,5M	7,1	64
	6	SPR	SRA	4-10 x 1,5M	8,2	66
	10	SPR	SRA	5-10 x 2M	7,5	76
	20	-	SRA	6-10 x 3,3M	8,4	81
	35	-	SRA	10-10 x 3,5M	7,4	81
12	3*	SPT	SRT	12 x 3M	8,0	48
	4	SPR	SRA	2-12 x 2M	9,2	54
	5^	SPT	SRT	2-12 x 2,5M	8,9	59
	6	SPR	SRA	3-12 x 2M	9,1	63
	10^	SPT	SRT	4-12 x 2,5M	8,9	73
	15	SPR	SRA	6-12 x 2,5M	8,7	78
	25	-	SRA	10-12 x 2,5M	9,2	82
	45	-	SRA	15-12 x 3M	9,6	81
16	4*	SPT	SRT	16 x 4M	11,3	48
	5	SPR	SRA	2-16 x 2,5M	12,2	52
	8	SPR	SRA	4-16 x 2M	13,0	63
	16	SPR	SRA	7-16 x 2,3M	12,6	75
	25	-	SRA	5-16 x 5M	11,5	80
	35	-	SRA	7-16 x 5M	12,2	82
20	4*	SPT	SRT	20 x 4M	15,3	42
	8	SPR	SRA	2-20 x 4M	14,8	59
	12	SPR	SRA	3-20 x 4M	15,0	67
	16	SPR	SRA	4-20 x 4M	15,0	72
	20	-	SRA	5-20 x 4M	15,0	76
	45	-	SRA	9-20 x 5M	15,8	82
24	5*	SPT	SRT	24 x 5M	18,5	42

\* Conforms to DIN 103 parts 1 & 2. Tolerance grade 7e.

^ Conforms to DIN 103 part 1, not defined in parts 2 & 3

See page 5 for maximum available screw lengths

## Lubrication



### Overview

We offer a full complement of lubricants including our low vapour pressure greases for clean room and vacuum application. The Thomson TriGel line is specifically formulated to offer a lubrication solution for a wide range of linear motion applications. Choose the appropriate gel for your requirements and get the utmost performance out of your Huco Dynatork products.

Thomson Neff	Tri-Gel-300S	Tri-Gel-450R	Tri-Gel-600SM	Tri-Gel-1200SC	Tri-Gel-1800RC
Application	Lead Screws Super-nuts, Plastic Nuts	Ball Screws, Linear Bearings	Bronze Nuts	Lead Screws, Plastic Nuts, Clean Room, High Vacuum	Ball Screws, Linear Bearings, Bronze Nuts, Clean Room, Vacuum
Maximum Temperature	200°C (392°F)	125°C (257°F)	125°C (257°F)	250°C (482°F)	125°C (257°F)
Mechanism Materials	Plastic on Plastic or Metal	Metal on Metal	Metal on Metal Bronze on Steel	Plastic or Metals, Combination	Metal on Metal
Mechanical Load	Light	Moderate	Moderate to Heavy	Light to Moderate	Moderate
Very Low Torque Variation over Temperature	Yes	-	-	Yes	-
Very Low Starting Torque	Yes	Yes	-	Yes	Yes
Compatibility with Reactive Chemicals	Not recommended w/o OEM testing	Not recommended w/o OEM testing	Not recommended w/o OEM testing	Usually OK	Not recommended w/o OEM testing
Compatibility with Plastics and Elastomers	May cause silicon rubber seals to swell	May cause EPDM seals to swell	May cause EPDM seals to swell	Usually OK	May cause EPDM seals to swell
Clean Room Use	Not recommended	Not recommended	Not recommended	Usually OK	Usually OK
High Vacuum Use	Not recommended	Not recommended	Not recommended	Usually OK	Usually OK
Vapor Pressure (25°C)	Varies with lot	Varies with lot	Varies with lot	1 x 10 <sup>-6</sup> Pa	0.5 x 10 <sup>-6</sup> Pa
Packaging 10cc Syringe ,45kg Tube	<b>TriGel-300S</b> <b>TriGel-300S-1</b>	7832867/ <b>TriGel-450R</b> 7832868/ <b>TriGel-450R-1</b>	,1kg tube/ <b>TriGel-600SM</b>	<b>TriGel-1200SC</b> NA	7832869/ <b>Tri-Gel-1800RC</b>

\* Maximum temperature for continuous exposure. Higher peak temperatures may be permissible but should be validated in the application by the OEM. Low temperature limits are -15°C or lower. Consult Huco Dynatork for specific details.

## Formulated for Plastic on Metal lead screw applications



PTFE coating is a dry film which creates a lubrication barrier between a metal substrate and a polymer bushing or lead nut. It can in some cases eliminate the need for an additional gel type lubricant which must be re-applied. It is well suited for use with our SuperNut line of plastic nuts and stainless steel lead screws. Lubrication maintenance intervals can be eliminated and the coating does not attract particulate like a gel lubricant. Gel lubricants can provide lower friction coefficients than dry film lubricants but must be maintained to prevent performance degradation. PTFE coating provides an attractive and clean\* alternative to gels and oils.

### Typical Properties

Type:	Bonded Solid Film Lubricant
Purpose:	increased Lubricity, Decreased Friction & Wear
Appearance:	Black Coating
Thickness:	Approx. 13 - 25 micron
Active Lubricant:	Polytetrafluoroethylene
Friction Coefficient:	0,06 to 0,12
Temperature Operating Range:	-250° to 290°C
Resistance to Acids:	Excellent
Resistance to Bases:	Very Good
Resistance to Solvents:	Excellent

\* Some particulate will be generated as a result of wear between the nut and screw. The screw may begin to show signs of "polishing" over time. This does not necessarily indicate failure.

## Other High Quality Precision Products from Huco Dynatork...



The worlds most comprehensive range of high precision misalignment couplings for motion control applications, including:

- Huco Oldham
- Huco Flex M Disc
- Huco Flex B Bellows
- Huco Flex P Double Loop
- Huco Multibeam
- Huco S-Beam
- Huco UniLat
- Huco-Pol Universal Joints
- Huco Varitork Friction Clutches
- Huco L & T Right Angle Gearboxes

Some air motors don't have a good reputation for efficiency but this is a criticism that can only be levelled at vane-type motors. The unique free floating piston design of the Huco Dynatork Air Motor is much easier to seal, making it far more efficient as most of the energy in the compressed air gets converted into motion. It consumes up to 90% less air than a vane motor doing the same work.

Aside from energy costs, the Dyantork Air Motor is the world's only step-controllable air motor. Because it starts and stops almost instantaneously, and gives maximum torque right from startup it can be used for accurate positioning applications.

