

Why Anti-Backlash Control is Important

Even the best manufacturing processes produce clearances between a screw and a mating nut. In applications where loads may be in either direction, backlash can result from these clearances creating unacceptable movement in the controlled mechanism as loads change. These applications are common in the paper, plastic, film, sheet metal forming processes, satellite, or other load-reversing applications.

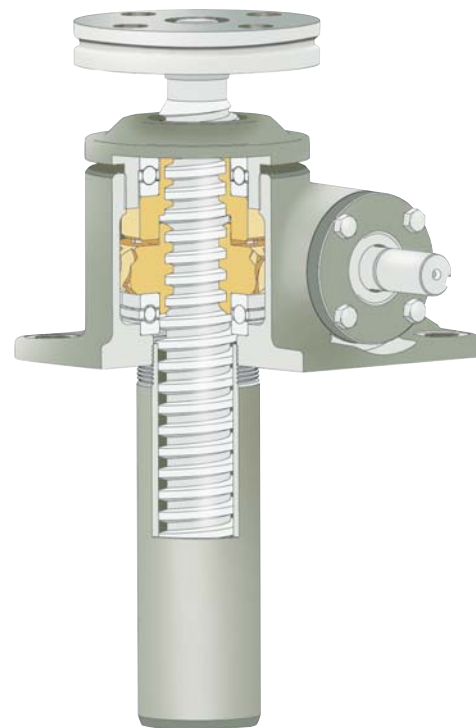
Such applications may be subjected to extreme vibrations. These vibrations can produce constant movement between the screw and lifting nut which can hammer the threads and cause premature wear.

To reduce this screw-to-nut backlash to an absolute minimum, Duff-Norton developed Anti-Backlash actuators. The design allows the backlash to be adjusted to the minimum value practical. As wear occurs, the actuator can be easily adjusted, without any disassembly, to return the backlash to its original minimum value.

Anti-Backlash Actuators

Features

- The industry's best backlash control
- A dual role as an internal safety nut
- Available with Standard, Optional, and Numeric Ratios
- Available in Stainless Steel for most capacities
- Precise motion control
- The ability to lock and hold a load, thereby eliminating the need for brake motors required for some applications
- Available on 1/4 to 150 Ton models



FL – TKM – 9402 – 6 – 1R

Model Prefix

R – Reducer
F – C-face Adapter
H – Hand Wheel
L – Limit Switch
E – Encoder
J – Rotary Counter

Screw End & Configuration

T – Threaded End
C – Clevis End
M – Top Plate
P – Plain End

K – Keyed Screw
CC – Double Clevis

D – Inverted Rotating
U – Upright Rotating

N – Numeric Ratio

Series & Capacity No.

Anti-Backlash (94xx, 48xx, 74xx, 4501)
 Special AB (104xx, 58xx, 84xx, 5501)

(1800 series base configurations are only available on 2 and 50 ton models)

Small Capacity AB (45xx, 4555, 4625)
 Special Small AB (55xx, 5555, 5625)

Capacities:

Upright model suffixes end with the capacity number.
 Inverted model suffixes lower the capacity number by one digit.
 Rotating model suffixes raise the capacity number by one digit.

1/4 & 1/2 Ton models suffixes are as shown and then change as previously described.

M – Base Model - Standard Material
SM – Base Model - Stainless Steel

Travel

1" increment travels are always represented using the exact travel amount.

Travels with fractional lengths are quoted using that length, but are serialized when the order is processed.

Serialized digits in this position may also be used for other models containing special features.

Model Suffix

B – Boot
L – Single End Worm Ext. Left
R – Single End Worm Ext. Right
1 – Optional Ratio #1
2 – Optional Ratio #2
X – Supplied without cover pipe



Anti-backlash actuators are commonly used on Satellites to enhance antenna tracking along the X,Y. and Z axes, and to protect Satellite performance against wind-shear.

When the screw (1) is under a compression load, the bottom of its thread surfaces are supported by the top thread surfaces of the worm gear (2). The anti-backlash nut (3), being pinned to the worm gear and floating on these pins and being adjusted downward by the shell cap, forces its bottom thread surfaces against the upper thread surfaces of the lifting screw at point (B). Thus, backlash between the worm gear threads and the lifting screw threads is reduced to a regulated minimum.

When wear occurs in the worm gear threads and the Anti-backlash nut thread, the load carrying thickness of the worm gear thread will be reduced. This wear will create a gap at point (B) and provide backlash equal to the wear on the threads.

Under a compression load, the lifting screw will no longer be in contact with the lower thread surface of the anti-backlash nut. Under this condition, backlash will be present when a tension load is applied.

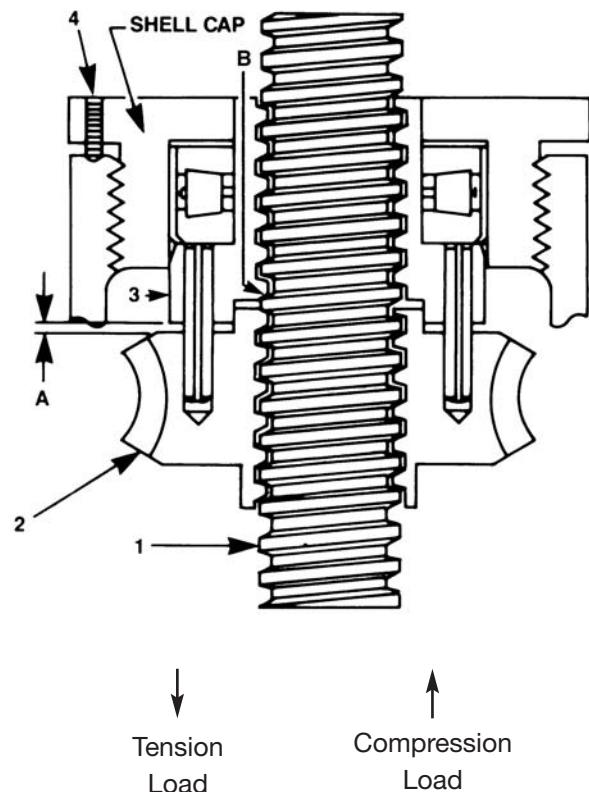
The anti-backlash feature can be maintained simply by adjusting the shell cap until the desired amount of backlash reduction is achieved. This will reduce the separation (A) between the anti-backlash nut and the worm gear and will reduce the backlash between the worm gear threads and the lifting screw to the desired minimum value.

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To avoid binding and excessive wear, do not adjust lifting screw backlash to less than .0005”.

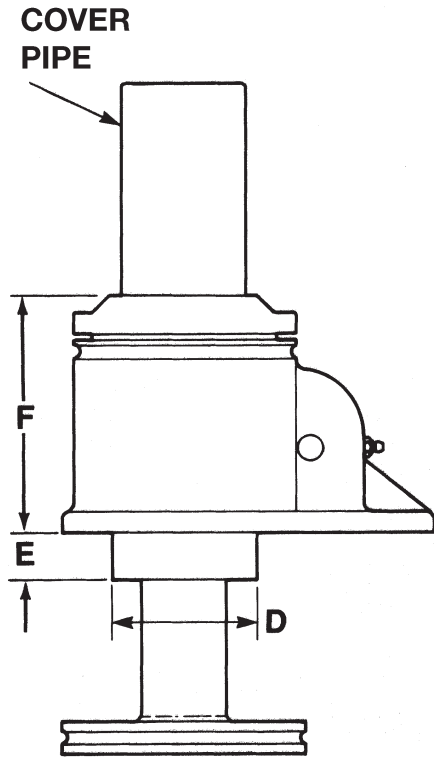
When separation (A) has been reduced to zero, the wear limit has been reached. . Replace the worn gear and backlash nut set at this point. This feature acts as a built in safety device.

Note: Use anti-backlash as a safety device or to provide wear indication for critical applications. Keyed anti-backlash models may require (A) key adaptor, which projects below jack base. See pg. 47 for dimensions.

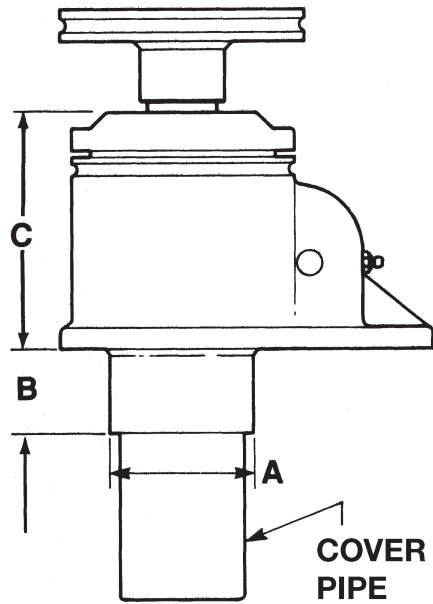


Key Adaptor Dimensions for Anti-Backlash Actuators

Keyed Anti-Backlash Inverted



Keyed Anti-Backlash Upright



Actuator Capacity (Tons)	Upright A Dia. (in)	Upright B (in)	Upright C (in)	Inverted D Dia. (in)	Inverted E (in)	Inverted F (in)
1/4 & 1/2	1.66	Pipe Length	2.38	1.25	.81	2.88
1	1.66	.75	3.84	1.50	.38	3.38
2	2.25	1.25	3.88	2.25	.63	3.88
3	2.25	1.25	4.34	2.25	.63	4.34
5	2.75	1.75	5.44	2.75	.88	5.44
10	3.38	2.00	5.75	3.38	1.13	5.75
15	3.63	2.00	6.13	3.63	1.25	6.13
20	4.00	1.50	7.75	4.00	1.00	7.75
25	5.50	2.25	9.69	5.50	1.25	9.69
35	6.50	2.38	9.44	6.50	1.25	9.44
50	7.00	3.00	11.75	7.00	3.00	11.75