

# Actuator Product Guide



# Introduction

Since 1883, Duff-Norton has manufactured quality industrial lifting, positioning and material handling equipment. Today, Duff-Norton continues this tradition through its dedication to the ISO 9001 standard of excellence.



Duff-Norton manufactures:



**Mechanical Actuators**



**Electromechanical Actuators**



**Rotary Unions**



**Jacks**

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The Duff-Norton Actuator Product Guide provides all of the basic information about Duff-Norton mechanical actuators. It includes technical information on standard actuator models and descriptions of the most commonly used accessories that are available. If you need further information about custom designed Duff-Norton mechanical actuators, or any other Duff-Norton product, please contact customer service at 1-800-477-5002, or your nearest Duff-Norton distributor.



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# Machine Screw Actuator Models

Duff-Norton offers a complete line of both standard and custom engineered machine screw actuators for applications up to 250 tons.

Upright Screw  
(top plate)



Clevis

Threaded



Machine screw actuators offer positive mechanical action, precise positioning, and uniform lifting speeds. Standard configurations include upright or inverted units with translating or rotating lifting screws, and top plate, threaded, or clevis ends. The anti-backlash option reduces vertical backlash resulting in smooth, precise operation and minimal wear.

Upright Rotating Screw  
also available in  
Inverted Rotating Screw



Inverted Screw



See the accessories section on page 12 for additional components for machine screw actuators.

# Machine Screw Actuators

## Specifications

### Machine Screw Actuator Units

Model Number	Upright	2555	2625	2501	1802 & 9002	9005	9010	9015	9020	9025	9035	1850	9075	9099	18150	2250
	Inverted	2554	2624	2500	1801 & 9001	9004	9009	9014	9019	9024	9034	1849	9074	9098	18149	2249
Capacity, Tons		1/4	1/2	1	2	5	10	15	20	25	35	50	75	100	150	250
Lifting Screw	Diameter (inches)	1/2	5/8	3/4	1	1 -1/2	2	2 -1/4	2 -1/2	3	3 -3/4	4 -1/2	5	6	7	9
	Pitch	0.250	0.125	0.200	0.250	0.375	0.500	0.500	0.500	0.666	0.666	0.666	0.666	0.750	1.000	1.000
	Type	Acme	Acme	Acme	Acme	Acme	Acme	Acme	Acme	Acme	Acme	Acme	Square	Square	Square	Square
Worm Gear Ratios	Std. Ratio	5:1	5:1	5:1	6:1	6:1	8:1	8:1	8:1	10- 2/3:1	10 -2/3:1	10 -2/3:1	10 -2/3:1	12:1	12:1	50:1
	Option #1	-	-	20:1	24:1	24:1	24:1	24:1	24:1	32:1	32:1	32:1	32:1	36:1	36:1	-
Turns or Worm For 1" Raise.	Std. Ratio	20	40	25	24	16	16	16	16	16	16	16	16	16	12	50
	Option #1	-	-	100	96	64	48	48	48	48	48	48	48	48	36	-
Maximum HP per Actuator	Std. Ratio	1/3	1/3	1/2	2	4	5	5	5	8	8	15	15	25	25	35
	Option #1	-	-	1/4	1/2	3/4	1 -1/2	1 -1/2	1 -1/2	2 -1/2	2 -1/2	6	6	11	11	-
Torque at Full Load* (In.-Lbs)	Std. Ratio	13	21	55	120	450	750	1,430	2,050	2,000	4,000	7,500	12,000	16,000	28,100	20,000
	Option #1	-	-	25	50	185	400	820	1,170	1,200	2,400	4,200	6,600	8,600	15,500	-
Efficiency Rating (%)	Std. Ratio	33.0	20.0	24.5	23.2	22.1	23.7	20.2	18.8	18.7	15.8	13.8	12.4	13.0	14.1	8.0
	Option #1	-	-	14.0	13.3	12.1	15.1	12.9	12.0	10.5	8.9	8.3	7.5	8.0	8.6	-
Weight with Base Raise of 6' (Lbs)		2.33	2.33	5	17	35	52	66	93	160	240	410	650	1,200	1,350	2,700
Weight for Each Additional 1" Raise (Lbs)		0.1	0.1	0.3	0.3	0.9	1.4	1.5	2.6	2.5	3.7	5.5	6.5	9.0	12.6	23.0

\* - For loads from 25% to 100% of actuator capacity, torque requirements are approximately proportional to the load.

Raises, measured in increments of one inch, are available up to 20 feet, depending on lifting screw diameter and available bar stock length.

Except for 1 ton and 75 ton units, standard inverted keyed models do not have a cover pipe.

## Numeric Controls

### 1 to 25 ton actuators with decimal ratio

#### Numeric Control Ratios - 100 turns = 1 inch of travel

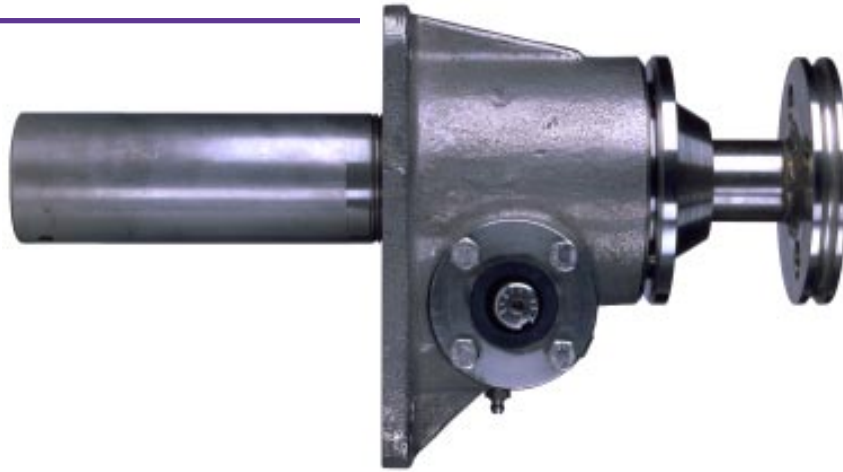
Model Number	Upright	2501	1802 & 9002	9005	9010	9015	9020	9025
	Inverted	2500	1801 & 9001	9004	9009	9014	9019	9024
Capacity, Tons		1	2	5	10	15	20	25
Lifting Screw Diameter (inches)		3/4	1	1 -1/2	2	2 -1/4	2 -1/2	3
		.200 Pitch	.250 Pitch	.250 Pitch	.250 Pitch	.250 Pitch	.250 Pitch	.320 Pitch
		Acme	Acme	Acme	Acme	Acme	Acme	Acme
Worm Gear Ratios		20:1	25:1	25:1	25:1	25:1	25:1	32:1
Turns or Worm For 1" Raise.		100	100	100	100	100	100	100
Torque at Full Load* (In.-Lbs)		24	48	175	370	640	925	1,500
Efficiency Rating (%)		13.30	13.20	9.10	8.60	7.50	6.90	5.30
Maximum HP per Actuator		1/4	1/2	3/4	1 -1/2	1 -1/2	1 -1/2	2 -1/2

All other data for these models is included in the table above

# Stainless Steel Actuator Models

For harsh environments, Duff-Norton offers a complete line of stainless steel machine screw actuators in standard and special configurations for loads up to 100 tons.

Upright Screw  
(top plate)



Clevis

Threaded



Duff-Norton Stainless Steel actuators incorporate all of the same features as Duff-Norton's standard machine screw actuators, but can be used in severe environments where other materials are inadequate. All exposed surfaces are made of 316 stainless steel including the lifting screw, housing, shell cap, worm and dust guard. Options include: anti-backlash and keyed lifting screws for translating screw models.

Upright Rotating Screw  
also available in  
Inverted Rotating Screw



Inverted Screw



See the accessories section on page 12 for available components for Stainless Steel actuators.

# Stainless Steel Actuators

## Specifications

### Stainless Steel Machine Screw Actuator Units

Model Number	Upright	SM-1802	SM-9005	SM-9010	SM-9015	SM-9020	SM-9025	SM-9035	SM-1850	SM-9099
	Inverted	SM-1801	SM-9004	SM-9009	SM-9014	SM-9019	SM-9024	SM-9034	SM-1849	SM-9098
Capacity, Tons	Sustained	2	5	10	15	20	25	35	50	100
	**Operating	0.66	1.66	3.33	5.00	6.66	8.33	11.66	16.66	33.33
Lifting Screw Diameter (inches)		1	1 -1/2	2	2 -1/4	2 -1/2	3	3 -3/4	4 -1/2	6
		.250 Pitch	.375 Pitch	.500 Pitch	.500 Pitch	.500 Pitch	.666 Pitch	.666 Pitch	.666 Pitch	.750 Pitch
		Acme	Acme	Acme	Acme	Acme	Acme	Acme	Square	Square
Worm Gear Ratios	Std. Ratio	6:1	6:1	8:1	8:1	8:1	10-2/3:1	10-2/3:1	10-2/3:1	12:1
	Option #1	24:1	24:1	24:1	24:1	24:1	32:1	32:1	32:1	36:1
Turns or Worm For 1" Raise.	Std. Ratio	24	16	16	16	16	16	16	16	16
	Option #1	96	64	48	48	48	48	48	48	48
Maximum HP per Actuator	Std. Ratio	2	4	5	5	5	8	8	15	25
	Option #1	1/2	3/4	1 -1/2	1 -1/2	1 -1/2	2 -1/2	2 -1/2	6	11
Torque at Full Load* (In.-Lbs)	Std. Ratio	40	150	250	475	685	665	1,335	2,500	5,335
	Option #1	17	60	135	275	390	400	800	1,400	2,865
Efficiency Rating (%)	Std. Ratio	23.2	22.1	23.7	20.2	18.8	18.7	15.6	13.8	13.0
	Option #1	13.3	12.1	15.1	12.9	12.0	10.5	8.9	8.3	8.0
Weight with Base Raise of 6' (Lbs)		19	37	55	70	96	168	250	420	1260

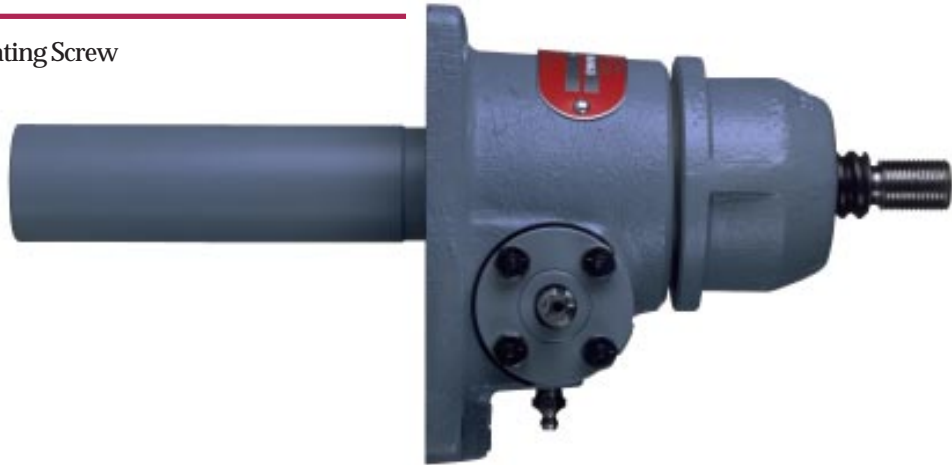
\* - For loads from 25% to 100% of actuator capacity, torque requirements are approximately proportional to the load.

\*\* - Actuator has been derated for 316 stainless steel worm. For full load rating use 17-4 PH worm.

# Ball Screw Actuator Models

Duff-Norton Ball Screw actuators come in many standard models, or can be custom designed for any application up to 50 tons.

Upright Translating Screw  
(threaded end)



Clevis

Top Plate



Duff-Norton Ball Screw actuators provide high efficiency and high speed in one linear positioning package. The positive action of the low friction ball screw and nut design provides longer life at load and requires less power to achieve a specified thrust. Ball screw actuators can be used individually, in tandem or as part of a larger mechanical system. With lifts up to 20 feet, Duff-Norton Ball Screw actuators offer the perfect solution to many linear positioning applications.

Upright Rotating Screw  
also available in  
Inverted Rotating Screw



Inverted Translating Screw

NOTE: Translating Screw Models covered  
by U.S. Patent No. 3,178,958



See the accessories section on page 12 for available components for Ball Screw actuators.

## Specifications Ball Screw Actuator Units

Model Number	Upright	28631	2802 & 9802*	28021 & 98021	28003	9805	98051**	9810	98101***	9820	9825	2860
	Inverted	28630	2801 & 9801*	28011 & 98011	28002	9804	98041**	9809	98091***	9819	9824	2859
Capacity, Tons		1/2	2	2	3	5	5	10	10	20	25	50
Lifting Screw Diameter (inches)		5/8	1	1	1 -11/64	1 -1/2	1 -1/2	1 -1/2	1 -1/2	2 -1/4	3	4
		.200 Lead	.250 Lead	1.000 Lead	.413 Lead	.474 Lead	1.000 Lead	.474 Lead	1.000 Lead	.500 Lead	.666 Lead	1.000 Lead
Worm Gear Ratios	Std. Ratio	5:1	6:1	6:1	6:1	6:1	6:1	8:1	8:1	8:1	10-2/3:1	10 2/3:1
	Option #1	20:1	24:1	24:1	24:1	24:1	24:1	24:1	24:1	24:1	32:1	32:1
	Option #2	-	12:1	-	12:1	-	-	-	-	-	-	-
Turns of Worm For 1" Raise.	Std. Ratio	25	24	6	14.526	12.667	6	16.888	8	16	16.160	10.660
	Option #1	100	96	24	58.104	50.667	24	50.667	24	48	48.480	32
	Option #2	-	48	-	29.052	-	-	-	-	-	-	-
Maximum HP per Actuator	Std. Ratio	1/3	2	2	2	4	4	5	5	5	8	15
	Option #1	1/6	1/2	1/2	1/2	3/4	3/4	1 -1/2	1 -1/2	1 -1/2	2 -1/2	6
	Option #2	-	3/4	-	3/4	-	-	-	-	-	-	-
Starting Torque at Full Load (In.-Lbs)	Std. Ratio	10.5	50	180	110	220	500	350	800	700	925	2700
	Option #1	5	25	80	50	90	206	175	400	325	475	1500
	Option #2	-	30	-	68	-	-	-	-	-	-	-
Running Torque at Full Load (In.-Lbs)	Std. Ratio	9.5	45	160	100	180	410	300	700	650	825	2200
	Option #1	4.5	20	70	45	80	183	150	290	300	425	1200
	Option #2	-	25	-	60	-	-	-	-	-	-	-
Hold Back Torque at Rated Load (Lb-Ft)	Std. Ratio	1.0	2	2	7	8	8	11	11	24	24	92
	Option #1	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	2	2	33
	Option #2	-	1	1	2	-	-	-	-	-	-	-
Efficiency Rating (%)	Std. Ratio	65.0	59.0	59.0	59.0	70.0	70.0	65.0	65.0	61.0	60.0	55.0
	Option #1	38.0	33.0	33.0	33.0	39.0	39.0	42.0	42.0	44.0	39.0	33.0
	Option #2	-	44.0	-	44.0	-	-	-	-	-	-	-
Weight with Base Raise of 6" (Lbs)		2.75	20	20	21	40	40	50	50	115	235	520
Weight for Each Additional 1" Raise (Lbs)		0.1	0.3	0.3	0.4	0.9	0.9	0.9	0.9	1.5	2.9	5.0

\* - Dimensions same as model 9802 & 2802

\*\* - Dimensions same as model 9805

\*\*\* - Dimensions same as model 9810

Note: Hold Back Torque is restraining torque at the worm shaft to keep loads from lowering.

Lifting torques are proportional to load down to 25% of rated load.

# Micro-Miniature Actuators



Duff-Norton Micro-Miniature actuators provide extreme precision in a compact package. Accurate to within .001 inch, and equipped with anti-backlash nuts to minimize vertical backlash between the screw and worm gear nut, these units are available with either balanced, or continuous dial readings for perfect positioning every time.

Standard Duff-Norton Micro-Miniature actuators come with aluminum shell caps and housings and include stainless steel worms and lifting screws. These actuators are also available with stainless steel shell caps and housings.

## Specifications

### Micro-Miniature Actuator Units

Model Number	M-3554-30	M-3554-27	M-3554-136
Capacity (Lbs)	500	1000	1000
Lifting Screw Diameter (inches)	1/2	5/8	5/8
Worm Gear Ratios	20:1	20:1	20:1
Turns or Worm For 1/2" Raise	500	500	500
Torque at Full Load* (In.-Lbs)	12	18	18
Shell Cap Housing	Aluminum	Aluminum	Stainless Steel
Weight (Lbs)	2	2	3

# High Duty Cycle Actuators

Duff-Norton High Duty Cycle actuators are specifically designed for continuous operation. The gear set operates in an oil bath for thermal efficiency and long life. With rated load capacities up to 13,000 pounds, and mechanical efficiency as high as 70%, High Duty Cycle actuators provide efficient, continuous service.



## Specifications

### High Duty Cycle Actuator Units

Model Number	7511	7515	7522
Maximum Load Capacity (Lbs)	3,500	12,000	27,000
Rated Load Capacity (Lbs)	2,000	5,200	13,000
Lifting Screw Diameter (inches)	1.171	1.500	2.250
	.413 Lead	.473 Lead	.500 Lead
Closed Height (in)	10 -3/8	11 -1/4	16 -5/8
Base Size (in)	5-1/2 x 7	7-1/2 x 8-3/4	10-1/4 x 13-3/4
Worm Gear Ratios	6:1	8:1	10-2/3:1
Turns of Worm For 1" Raise.	14.500	16.888	21.333
Maximum HP per Actuator @ 1750 RPM	2	5	10
Starting Torque at Full Load (In.-Lbs)	75	200	420
Running Torque at Full Load (In.-Lbs)	60.0	170	350
Hold Back Torque* at Rated Load (Lb-Ft)	4.0	9	12
Efficiency Rating (%)	70.0	70.0	65.0
Weight with Base Raise of 6" (Lbs)	19.0	43	95
Weight for Each Additional 1" Raise (Lbs)	0.4	0.9	1.5

\* - Hold Back Torque is restraining torque at the worm shaft to keep loads from running down.

# Actuator Accessories



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## Gear Boxes

Available in 3-way and 4-way models.

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## Rotary Limit Switches

Available for all Duff-Norton actuators above 1 ton.



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## Position Indicators

Both analog and digital displays available for accurate feedback and control.

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## Flexible Couplings

Available in Jaw type, Full-Flex and Flex-Rigid models.



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## Drives and Controls

Controls, motors and complete linear positioning systems available for standard and custom applications.



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