Andco Series 7000 Actuator

Posi-Tork Acme Screw
Posi-Tork Ball Screw
Instruction Manual

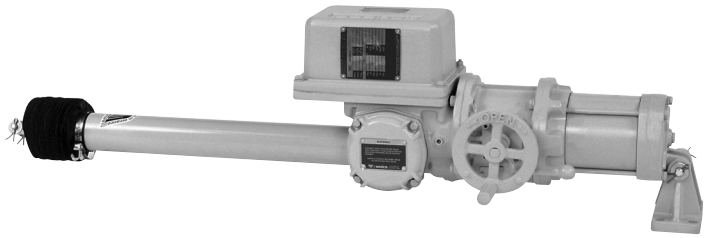


Table of Contents

NOTICE

The information contained in this manual is essential to safe, successful, long term operation of your Andco 7000 linear actuator. Read and follow the requirements concerning storage, installation and adjustments. Failure to do so could void the warranty covering your actuator.

AVIS

Les renseignements contenus dans ce manuel sont essentiels au fonctionnement sûr, efficace, durable de votre actionneur linéaire Andco 7000. Lisez et respectez les exigences relatives au stockage, à l'installation et aux réglages. Le non-respect de ces exigences peut annuler la garantie couvrant votre actionneur.

Introduction

This manual describes the general operating principles of the Model 7000 Posi-Tork Linear Actuators. Information is also provided for installation, operation, servicing, and storage of the actuator. All the information contained herein is essential to safe, successful long term actuator operation. Please carefully read and thoroughly understand the content of this manual. Failure to follow the instructions provided could void the actuator's warranty. If the answers to your questions are not contained in this manual, please contact Dresser Natural Gas Solutions toll free at 1-800-945-9898**.** Be sure to mention the model and serial number when requesting information.

Intent of Usage

The 7000 Posi-Tork Linear Actuators are completely self-contained, electro-mechanical devices. These actuators, designed and fabricated for dependable long-life operation, are used for positioning, automation of material handling or flow control equipment.

The actuator is powered by a high starting torque, low inertia electric motor connected to a drive screw through a set of spur gears.

Upon stroke completion, a gear driven position limit switch interrupts power to the motor. If actuator movement is prevented at any point during travel due to an external mechanical overload, a thrust switch will interrupt power to the motor.

Storage Requirements

1. Actuators should always be stored in a clean, dry environment.
2. If outdoor storage cannot be avoided, the actuator must be stored high enough to avoid immersion in snow or water.
3. If installed, the optional compartment heaters should be temporarily wired and energized if the actuator is to be stored in a damp location.
4. All covers must remain securely fastened in place.
5. All pipe plugs must remain tightly in place.
6. The storage location should be selected so the actuator is not exposed to mechanical damage.
7. For extended storage (over 3 months outdoors or 6 months indoors), desiccant bags must be placed inside of the electrical compartments. Tags must be attached to the outside of the compartment covers instructing removal of the bags before start of operation.

Lifting Instructions

1. Lift 7000 Series Actuator at body tube and motor housing.
2. Follow applicable safety guidelines when lifting or moving actuator.

CAUTION
LIFTING HAZARD Single person lift could cause injury. Use assistance when moving or lifting.

ATTENTION
RISQUE LIÉ AU LEVAGE Le levage de l'unité par une seule personne est dangereux. Demandez de l'aide lors du déplacement ou du levage de l'unité.

Model Number Identification

Each actuator is identified by model, serial and order number on the name plate. The name plate is located on the limit switch compartment cover. Use all three (3) numbers when ordering parts and making inquiries.

Repair of any actuator is to be done only by an authorized service center or by individuals certified by Andco Actuators. Only routine maintenance may be performed by unauthorized personnel.

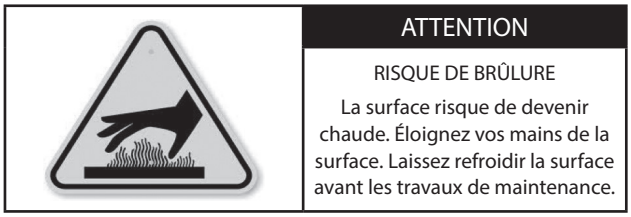
	WARNING
	PPE Approved Personnel Protective Equipment for the site must be worn.

	AVERTISSEMENT
	EPI Il convient de porter un équipement de protection individuelle sur le site.

	WARNING
	GROUNDING LUG Unit must be grounded with minimum size 10 AWG wire.

	AVERTISSEMENT
	PATTE DE MISE À LA TERRE L'unité doit être mise à la terre avec un fil de calibre 10 au moins.

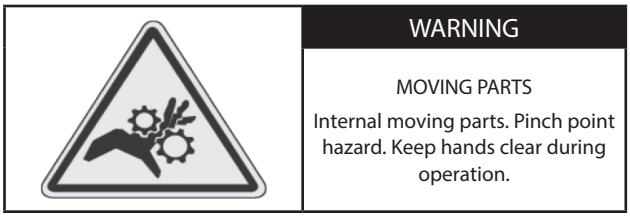
	CAUTION
	BURN HAZARD Possible hot surface. Keep hands clear of surface. Allow surface to cool before performing any maintenance.



ATTENTION

RISQUE DE BRÛLURE

La surface risque de devenir chaude. Éloignez vos mains de la surface. Laissez refroidir la surface avant les travaux de maintenance.



WARNING

MOVING PARTS

Internal moving parts. Pinch point hazard. Keep hands clear during operation.

AVERTISSEMENT

PIÈCES MOBILES

Pièces mobiles internes. Risque de point de pincement. Tenez vos mains éloignées pendant le fonctionnement.

CAUTION

SERVICE PERSONEL

Service operators must be licensed/trained and authorized before being allowed to perform maintenance on the actuator.

ATTENTION

PERSONNEL DE MAINTENANCE

Les opérateurs de maintenance doivent être licenciés/formés et agréés avant de pouvoir effectuer des travaux de maintenance sur l'actionneur.

CAUTION

VOLTAGE SUPPLY

Verify that the supply voltage to the actuator matches the voltage on the nameplate on the limit switch compartment cover (51).

ATTENTION

SOURCE DE TENSION

Vérifiez que la source de tension de l'actionneur correspond à la tension indiquée sur la plaque signalétique du couvercle du compartiment interrupteur de fin de course (51).

CAUTION

CONDUCTOR TEMPERATURE RATING

All conductors used for field wiring connections to the actuator shall carry a rating for a minimum temperature of 90°C.

ATTENTION

TEMPÉRATURE NOMINALE DES CONDUCTEURS

Tous les conducteurs utilisés pour les raccordements du câblage sur site de l'actionneur doivent présenter une température nominale minimum de 90 °C.

Installation

Installation Requirements

1. Mount the actuator with the limit switch compartment oriented either vertically or horizontally. This prevents the lubricant from pressing against the switch seals.
2. To prevent premature wear of the drive nut, extension rod seal, and wiper, ensure that alignment between the actuator mounting support and the driven equipment does not exert side load on the extension rod at any point throughout the full stroke of the actuator.
3. Before operating the actuator, make sure all the mounting attachments and driven equipment are properly secured and all the covers are properly tightened.
4. The actuator must be installed and wired in accordance with the most current National Electrical Code.
5. Route the electrical conduit into the actuator to prevent internal condensation from running into the limit switch compartment.
6. Verify proper motor rotation relative to the limit switch. The motor rotation may be reversed, if necessary, by reversing the motor lead connections. (Refer to Geared Position Limit Switch Adjustment instructions on page 13 and the electrical wiring diagram provided with the actuator).
7. Keep the position and thrust switch compartments dry and clean.

WARNING

Disconnect all electrical power before removing covers of either position or thrust switch compartments.

AVERTISSEMENT

Débranchez tous les câbles électriques avant d'ôter les couvercles des compartiments des commutateurs de position ou à pousser.

8. Verify the setting of the position limit switches. Readjust the geared position limit switches before operating the actuator if necessary. (Refer to Geared Position Limit Switch Adjustment instructions on page 13 and the electrical wiring diagram provided with the actuator).
9. Keep the geared position limit switch contacts clean. Use CRC Lectra Clean® or other suitable solvent on a lint free cloth.
10. Do not use an abrasive cloth or paper to clean the silver contacts on the position limit switches.

WARNING

DO NOT defeat the purpose of the thrust switch by jumping, bypassing or disconnecting the switch connection wiring (wire numbers 17, 17A, 18 or 18A per electrical wiring diagram provided with the actuator. This could cause serious damage to the actuator or the driven equipment.

AVERTISSEMENT

NE portez PAS atteinte à l'objet du commutateur à pousser en faisant sauter, en contournant ou en débranchant le câblage des commutateurs (numéros de fil 17, 17A, 18 ou 18A selon les schémas de câblage fourni avec l'actionneur. Vous risqueriez d'endommager gravement l'actionneur ou l'équipement entraîné.

11. Do not hammer or gouge the outside surface of the extension rod. This may damage the plating integrity or cause surface irregularities which can damage the rod seals.
12. Keep the extension rod and clevis pin clean and lubricated.
13. Dust-ignition proof actuators must have all covers secured before the electrical circuits are energized.
14. Dust-ignition proof actuators must have the grounding lug connected to a suitable grounding system prior to operation.

CAUTION

VOLTAGE SUPPLY

Verify that the supply voltage to the actuator matches the voltage on the nameplate on the limit switch compartment cover (51).

ATTENTION

SOURCE DE TENSION

Vérifiez que la source de tension de l'actionneur correspond à la tension indiquée sur la plaque signalétique du couvercle du compartiment interrupteur de fin de course (51).

Motor Operation

The electric motor (30) has a pinion mounted on it's shaft. This pinion (40) engages the drive gear (41) which is mounted on the end of the drive screw (45). The drive screw has external Acme type threads and is engaged in the internal threads of the mating drive nut (2). Refer to Figure 1, page 5, and Table 1, page 6.

The drive nut is held from rotating by four tie rods (48). Rotation of the drive screw causes an axial movement of the drive nut.

A tubular extension rod (47) is fastened on one end of the drive nut and is extended or retracted with the axial movement of the drive nut.

The drive screw is supported by two ball bearings (13), which are spaced apart by multiple belleville springs (33). The Belleville springs are preloaded and prevent any axial movement on the drive screw. An external driven load is fastened to the extension rod by the clevis (8) and clevis pin (10). When the driven force exceeds preload force of the belleville springs, the drive screw moves axially. Axial movement of the drive screw is translated by the thrust switch sleeve (5) to rotational movement of the lever of thrust switch (66). The thrust switch will interrupt the electric circuit to the motor. The extend and retract thrust switches are independent of each other, allowing for the actuator to be backed out of a jam.

WARNING

MOVING PARTS

Internal moving parts. Pinch point hazard. Keep hands clear during operation.

AVERTISSEMENT

PIÈCES MOBILES

Pièces mobiles internes. Risque de point de pincement. Tenez vos mains éloignées pendant le fonctionnement.

Geared Position Limit Switch Operation

For most applications, the geared position limit switches control the actuator position by interrupting the motor control circuit at the end of the extend and retract strokes. Rotation of the drive screw is transmitted through the helical gear (6) to the geared position limit switch. The limit switch assembly has two independently adjustable trip points intended to control the end position of the extend and retract strokes. An optional geared position limit switch assembly with four independently adjustable trip points provides two intermediate trip points for signal indication or electrical interlocking with other equipment requiring an electrical signal related to the intermediate positions of the extend or retract strokes.

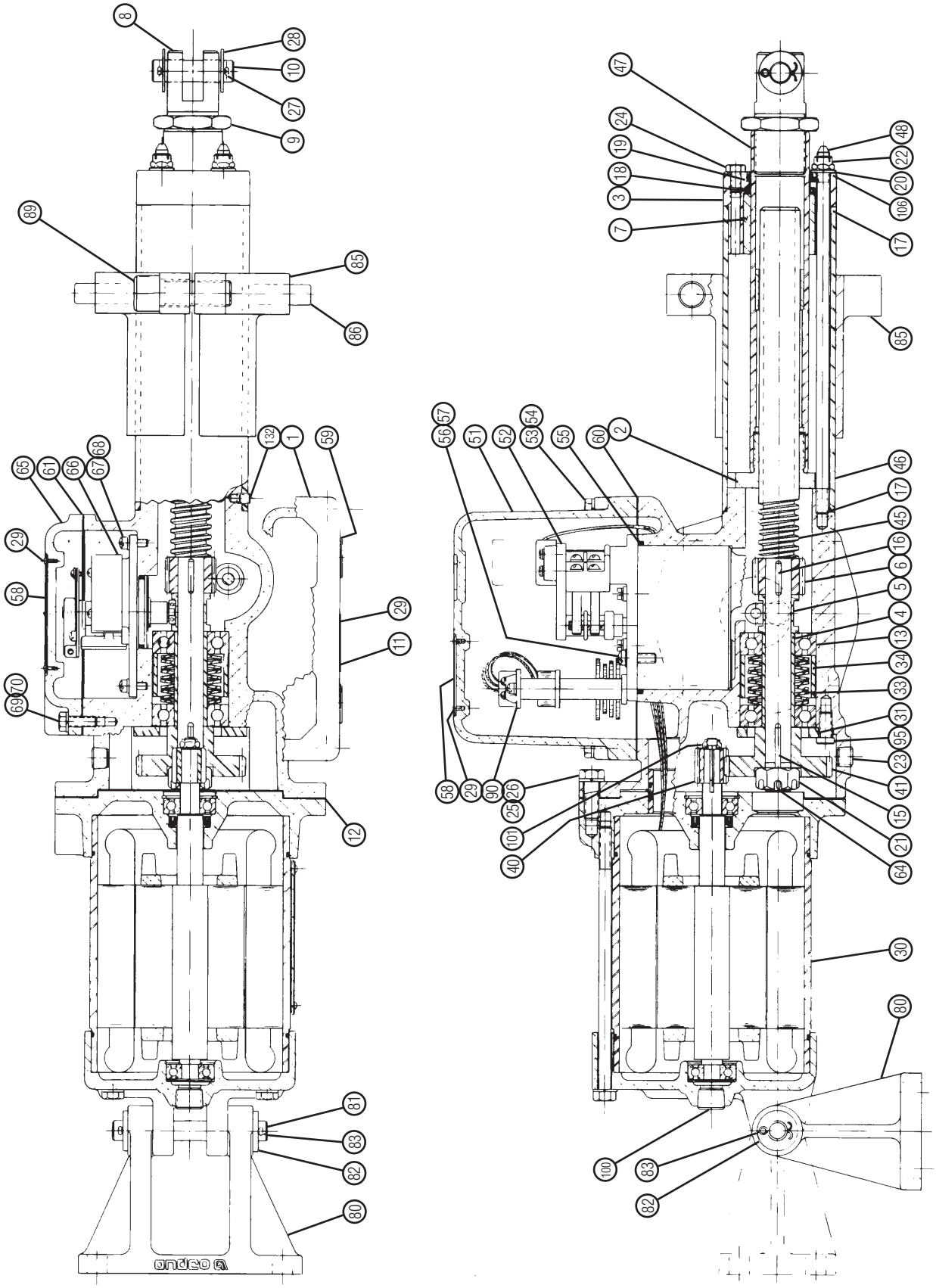


Figure 1 - Acme Screw Actuator Parts Drawing

Table 1 - ACME Screw Actuator Parts List

Item	Description
1	Body Housing
2	Drive Nut
3	End Cap
4	Bearing Sleeve
5	Thrust Switch Sleeve
6	Helical Gear
7	Bushing for End Cap
8	Clevis
9	Jam Nut
10	Clevis Pin
11	Nameplate
12	Motor Gasket
13	Ball Bearing
15	Key (for drive gear)
16	Key (for helical gear)
17	O-ring
18	Polypak Rod Seal
19	Rod Wiper

Item	Description
20	Thread Seal or O-ring & Washer
21	Slotted Hex Nut
22	Flexlocnut
23	Pipe Plug
24	Hex Head Cap Screw
25	Hex Head Cap Screw
26	Lockwasher
27	Cotter Pin
28	Flat Washer
29	Drive Studs
30	Motor
31	Bearing Plate
33	Belleville Springs
34	Thrust Limit Sleeve
40	Motor Pinion
41	Drive Gear
45	Drive Screw
46	Body Tube

Item	Description
47	Extension Rod
48	Tie Rod
51	Limit Switch Compartment Cover
52	Gear Limit Switch Assembly
53	Socket Head Cap Screw
54	Lockwasher
55	O-Ring
56	Socket Head Cap Screw
57	Internal Tooth Lockwasher
58	Warning Plate
59	Pipe Plug
60	Limit Switch Gasket
61	Thrust Switch Gasket
64	Cotter Pin
65	Thrust Switch Compartment Cover
66	Thrust Switch Assembly

Item	Description
67	Socket Head Machine Screw
68	Internal Tooth Lockwasher
69	Socket Head Cap Screw
70	Lockwasher
80	Knife Mounting Bracket
81	Trunnion Pin
82	Flat Washer
83	Cotter Pin
85	Body Tube Adapter
86	Dowel Pin
89	Socket Head Cap Screw
90	Potentiometer Sub Assembly
95	Low Head Socket Screw
100	Motor Pipe Plug
101	Flexlocnut
106	O-Ring
132	Set Screw

The geared position limit switch assembly is driven by the direct gearing on the drive screw and synchronized at all times with linear movement of the extension rod. After initially setting the extend and retract trip points, as determined by the position of the extension rod, the switches will trip repeatedly at these same points.

Refer to the Geared Position Limit Switch Adjustment instructions on page 13.

Thrust Limit Switch Operation

The factory preset thrust switch assembly protects the actuator and driven equipment from mechanical overloads. The thrust switch has a dial with pointer type settings which can be field adjusted to increase or decrease the thrust load. The higher the number setting on the thrust switch, the higher the external thrust force the switch will sense to interrupt the motor circuit.

Refer to the Thrust Limit Switch Setting Adjustment instructions on page 14.

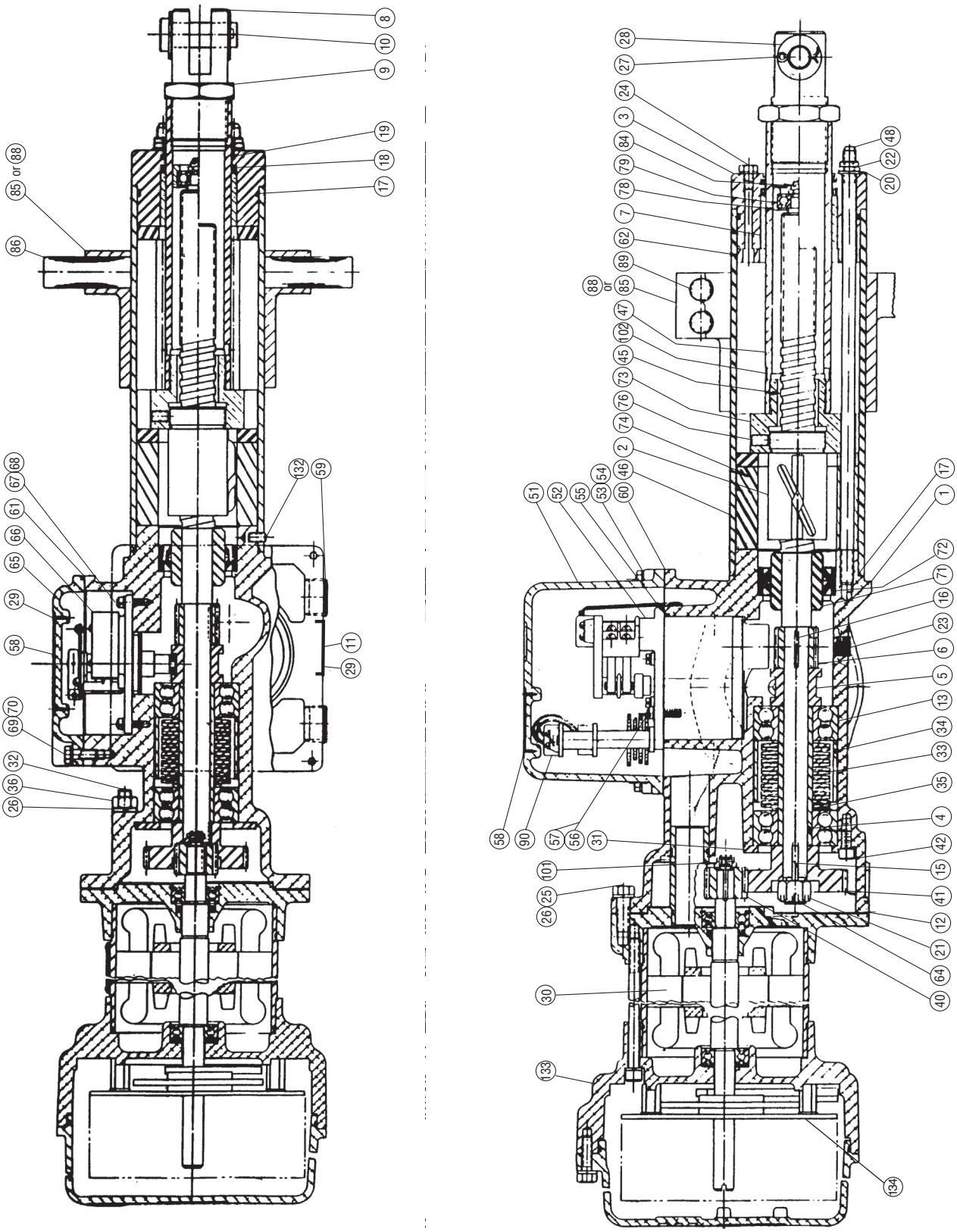


Figure 2 - Ball Screw Actuator Drawing

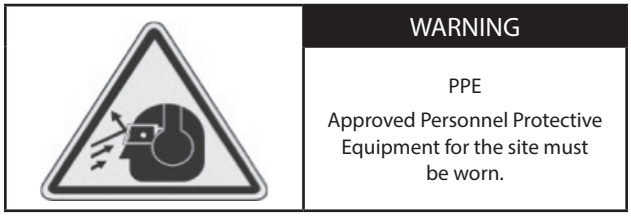
Table 2 - Ball Screw Actuator Parts List

Item	Description
1	Body Housing
2	Ball Nut
3	End Cap
4	Bearing Sleeve
5	Thrust Switch Sleeve
6	Helical Gear
7	End Cap Bushing
8	Clevis
9	Jam Nut
10	Clevis Pin
11	Nameplate
12	Motor Gasket
13	Ball Bearing
15	Key (for drive gear)
16	Key (for helical gear)
17	O-ring (for body tube)
18	Polypak Rod Seal
19	Rod Wiper
20	Thread Seal
21	Castle Nut
22	Flexlocnut

Item	Description
23	Pipe Plug (for housing)
24	Hex Head Cap Screw
25	Hex Head Cap Screw
26	Lockwasher
27	Cotter Pin
28	Flat Washer
29	Drive Studs
30	Motor
31	Bearing Plate
32	Stud
33	Belleville Springs
34	Thrust Limit Sleeve
35	Support Washer
36	Hex Nut
40	Motor Pinion
41	Drive Gear
42	Low Head Socket Cap Screw
45	Drive Screw
46	Body Tube
47	Extension Rod
48	Tie Rod

Item	Description
51	Limit Switch Compartment Cover
52	Gear Limit Switch Assembly
53	Socket Hd Cap Screw
54	Lockwasher
55	O-Ring
56	Socket Head Cap Screw
57	Internal Tooth Lockwasher
58	Warning Plate
59	Pipe Plug (conduit opening)
60	Gasket
61	Gasket
62	End Cap Cushion
64	Cotter Pin
65	Thrust Switch Compartment Cover
66	Thrust Switch Assembly
67	Socket Head Cap Screw

Item	Description
68	Internal Tooth Lockwasher
69	Socket Head Cap Screw
70	Lockwasher
71	Oil Seal Bushing
72	Oil Seal
73	Ball Nut Coupling
74	Coupling Stop
76	Socket Set Screw
78	Bearing Cartridge
79	Bearing
84	Flexlocnut
85	Body Tube Adapter
86	Dowel Pin
88	Body Tube Flange
89	Socket Head Cap Screw
90	Potentiometer Sub Assembly
107	Flexlocnut
132	Hex Head Cap Screw
133	Electric Brake Housing
134	Brake Assembly (refer to figure 3)



WARNING

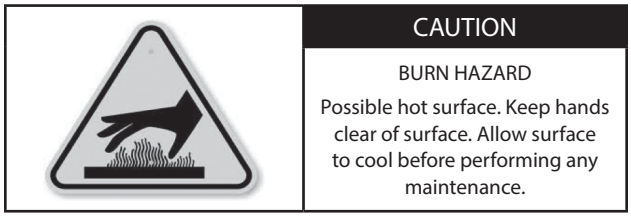
PPE

Approved Personnel Protective Equipment for the site must be worn.

AVERTISSEMENT

EPI

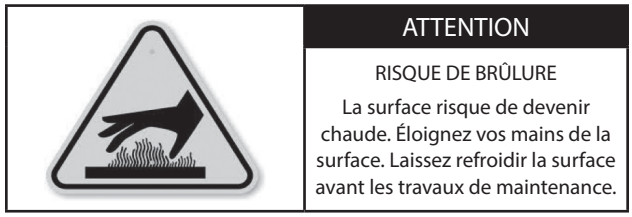
Il convient de porter un équipement de protection individuelle sur le site.



CAUTION

BURN HAZARD

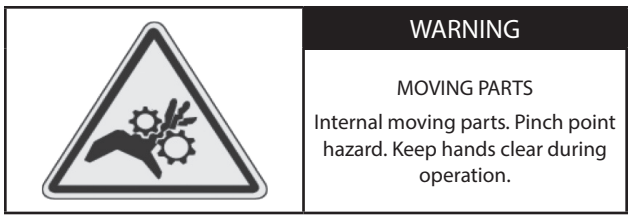
Possible hot surface. Keep hands clear of surface. Allow surface to cool before performing any maintenance.



ATTENTION

RISQUE DE BRÛLURE

La surface risque de devenir chaude. Éloignez vos mains de la surface. Laissez refroidir la surface avant les travaux de maintenance.



WARNING

MOVING PARTS

Internal moving parts. Pinch point hazard. Keep hands clear during operation.

AVERTISSEMENT

PIÈCES MOBILES

Pièces mobiles internes. Risque de point de pincement. Tenez vos mains éloignées pendant le fonctionnement.

CAUTION

LIFTING HAZARD

Single person lift could cause injury.
Use assistance when moving or lifting.

ATTENTION

RISQUE LIÉ AU LEVAGE

Le levage de l'unité par une seule personne est dangereux.
Demandez de l'aide lors du déplacement ou du levage de l'unité.

Maintenance –

Disassembly and Reassembly of Model 7000 Posi-Tork Acme Screw Unit

WARNING

Disconnect all electrical power before removing covers of either position or thrust switch compartments.

AVERTISSEMENT

Débranchez tous les câbles électriques avant d'ôter les couvercles des compartiments des commutateurs de position ou à pousser.

CAUTION

SERVICE PERSONEL

Service operators must be licensed/trained and authorized before being allowed to perform maintenance on the actuator.

ATTENTION

PERSONNEL DE MAINTENANCE

Les opérateurs de maintenance doivent être licenciés/formés et agréés avant de pouvoir effectuer des travaux de maintenance sur l'actionneur.

1. Remove the position and thrust switch compartment covers (51) and (65).
2. Disconnect the leads on the gear position and thrust limit switches, making sure they are properly marked for reconnection. Remove the pipe plug (23) on the side of the housing (1) to vent air into the housing as the switches are being removed. The geared position limit switch assembly is mounted by hardware (56 and 57). The limit switch assembly is removed by rotating the assembly clockwise approximately 90° while pulling the assembly up out of the housing. This is required to remove the switch helical gear input shaft out of mesh with the helical gear (6) on the drive screw (45). Remove the o-ring (55). The thrust switch assembly is mounted by hardware (67 and 68). Remove the thrust switch assembly. Both switches must be removed to permit removal of the drive screw sub-assembly.
3. Replace the complete geared position limit switch assembly rather than attempting field repair.
4. Disconnect the motor leads making sure they are properly marked for reconnection.
5. Remove the motor (30) by unfastening the screws (25) and removing lockwashers (26).
6. Remove the locknut (101) if the motor pinion (40) is to be replaced.
7. With a socket wrench on the locknut (21) turn the drive screw (45) counterclockwise extending the extension rod (47) until rotation becomes difficult due to the drive nut (2) bottoming out against the end cap (3).
8. Remove the cotter pin (64) and slotted hex nut (21).
9. Pull out the drive gear (41) and remove the key (15) from the drive screw.
10. Remove the bearing plate (31) by backing out all four screws equally.
11. Rotate the drive screw (45) by hand approximately 20 to 25 turns counterclockwise so that the acme threaded portion can be disconnected from the drive nut (2). Pull out the drive screw sub-assembly.
12. Loosen the jam nut (9) from the face of the extension rod (47).
13. Remove the clevis (8)
14. Scribe alignment marks on the side of the housing (1) in line with the set screws (132) in the body tube (46).
15. Remove the locknut (22), washer (20) and where applicable the o-ring (106) from the tie rods (48).
16. Remove the set screws (132) from the body tube.
17. While tapping on the outside surface of the end cap (3), pull out the body tube along with the end cap.
18. Remove the drive nut from the extension rod by using a spanner wrench on the holes. The threaded portion of the extension rod is loctited to the drive nut; it may be necessary to heat the extension rod outside diameter over the threads. If heat is required, do not exceed 350°F.

To reassemble the actuator, reverse the above procedures as well as the following instructions:

Step 18: Use Loctite® 242 or equivalent on the threads when reassembling the drive nut to the extension rod.

Step 17: Realign the set screw hole in the body tube with the alignment mark scribed on side of the housing in Step 14.

Step 12: Use a spacer to compress the belleville springs (33) enough to draw the following items up tightly: helical gear (6), thrust switch sleeve (5) and bearing sleeve (4). The spacer should match the following dimensions of the hub drive gear (41):

- Hub outside diameter
- Hub inside bore
- Length along hub inside bore

Reinstall the drive screw into the drive nut by rotating the drive screw clockwise until the outer race of forward ball bearing (13) bears firmly against the

shoulder machined in the housing.

Step 10: With the bearing plate (31) in place, remove the spacer used in Step 12; resume reassembly.

When assembling joints with flat gaskets, perform these steps:

Clean and inspect the joint faces for damage.

Apply Permatex Ultra Black sealant to both sides of a new gasket and assemble.

Tighten the fasteners to a low torque: 5-7 ft-lbs for 3/8" bolts and 2-3 ft-lbs for ¼" screws.

Allow to sit for 15 minutes.

Proceeding in an X pattern, torque the fasteners: 17-19 ft-lbs for 3/8" bolts and 5-6 ft-lbs for ¼" screws.

Tighten all bolts evenly, increasing the torque with each tightening cycle until the final torque is reached.

Let the units stand for 8 hours.

Back off the fasteners 30 degrees (1/2 flat).

Retorque the fasteners as before.

After reassembly, final adjustments can be made by again threading the clevis in or out of the extension rod as previously mentioned.

The actuator must be lubricated before being returned to operation. Use the lubricants listed in Table 5. Fill the gear cavity under the recess for the geared position limit switch assembly (52).

Remove the loctited hex head cap screw (24) in the end cap; it may be necessary to heat the end cap near the cap screw. If heat is required, do not exceed 350°F. Temporarily install a grease fitting. Add the lubricant through this fitting.

When lubrication is completed, remove the temporary grease fitting and reinstall the screw; applying Loctite® 242 or equivalent to the screw threads.

Remove the pipe plugs (23) in the bottom and side or top of the housing.

Install the lubricant through the bottom opening until the lubricant starts to flow out through the side opening. Reinstall the pipe plugs.

Disassembly and Reassembly of the Model 7000 Posi-Tork Ball Screw Actuator

WARNING

Disconnect all electrical power before removing covers of either position or thrust switch compartments.

AVERTISSEMENT

Débranchez tous les câbles électriques avant d'ôter les couvercles des compartiments des commutateurs de position ou à pousser.

CAUTION

SERVICE PERSONEL

Service operators must be licensed/trained and authorized before being allowed to perform maintenance on the actuator.

ATTENTION

PERSONNEL DE MAINTENANCE

Les opérateurs de maintenance doivent être licenciés/formés et agréés avant de pouvoir effectuer des travaux de maintenance sur l'actionneur.

1. Remove the position limit and thrust switch compartment covers (51 and 65).
2. Disconnect the leads on the geared position limit switch and thrust switch, making sure they are properly marked for reconnection to the proper terminals. Remove a pipe plug (23) in the side of the housing (1) to make a path for vent air into the housing as the switch assembly is being pulled from it's mounting. The geared position limit switch assembly is retained by hardware (56 and 57). Remove the limit switch assembly by removing the hardware and rotating the switch assembly clockwise approximately 90° while pulling the assembly up out of the housing. This is required to move the helical gear input shaft out of mesh with the helical gear (6) on the drive screw (45). Remove the o-ring (55). The thrust switch assembly is retained by removing the hardware and pulling the assembly straight up. Both switches must be removed to permit removal of the drive screw sub-assembly.
3. Replace the complete geared position limit switch assembly rather than attempting field repairs.
4. Disconnect the motor leads making sure that they are properly marked for reconnection to the proper terminals.
5. Remove the motor (30), and brake housing (133) by removing the screws (25) and lockwashers (26).
6. Remove the locknut (101) if the motor pinion (40) is to be replaced.
7. With a socket wrench on the castle nut (21), turn the drive screw (45) counterclockwise extending the extension rod (47) until rotation becomes difficult due to the ball nut coupling (73) bottoming out against the cushion stops.
8. Remove the drive screw cotter pin (64) and slotted hex nut.
9. Pull out the drive gear (41) and remove the key (15) from the drive screw.
10. Remove the bearing plate (31) by backing out all four screws (42) equally.

WARNING

DO NOT back out the drive screw more than is required for access. To do so could cause loss of complete screw engagement in ball nut and allow balls to drop out. Slide thrust switch sleeve (5) and helical gear (6) off screw. Oil seal bushing (71) is loctited in place and will not require removal.

AVERTISSEMENT

N'enlevez PAS le clou-vis davantage que ce qui est requis pour bénéficier d'un accès. Autrement, vous risqueriez de le dégager complètement dans l'écrou sphérique et de faire tomber les billes. Faites glisser le manchon du commutateur à pousser (5) et la roue hélicoïdale (6) hors du clou-vis. Du loctite est appliqué sur la douille de la bague d'étanchéité (71) alors qu'elle est en place; elle ne nécessitera donc pas d'être ôtée.

11. Rotate the drive screw (45) by hand counter-clockwise to expose the bearings (13), disc springs and bearing sleeve (4) for removal.
12. Loosen the jam nut (9) from the face of extension rod.
13. Remove the clevis (8).
14. Scribe alignment marks on the side of the housing in line with the hex head cap screws in the body tube (46).
15. Remove the locknut (22), washer and, where applicable, o-ring or thread seal from the tie rods (48).
16. Remove the set screws from body tube.
17. By tapping on the outside surface of the end cap (3), pull out the body tube along with the end cap
18. Remove the ball nut coupling from the extension rod by using a spanner wrench on the holes. The threaded portion of the extension rod is loctited to the ball coupling, so that it may be necessary to heat the extension rod outside diameter over the threads. If heat is required, do not exceed the 350°F maximum surface temperature.
19. On longer stroke actuators the end of the drive screw is bearing supported. If your actuator has this feature, remove the flexlocnut and the bearing cartridge.
20. Loosen the set screws (76) from the ball nut coupling and turn off from the ball nut (2).
21. Secure with tape and leave the ball nut on the drive screw if both items are to be reused. If the ball nut will be reused and drive screw requires further work or replacement, remove ball nut on to a bar or tube with an outside diameter slightly less than the root diameter of the ball screw. If ball nut requires replacement, removal from the drive screw may be done.

To reassemble the actuator, reverse the procedure including the following information:

Step 20: When the ball nut coupling (73) is securely tightened to the ball nut (2) make sure the ball return tube(s) in the ball nut lined up with the clearance notches in the coupling stop/ cushion (74) or (62). Use Loctite® 242 on the socket set screws (76) and tighten to the minimal torque.

1/4 - 20	6 FT-LBS
5/16 -18	12 FT-LBS
3/8 -16	20 FT-LBS
1/2 -13	43 FT-LBS

Step 18: Use Loctite® 242 on the threads when reassembling the ball nut coupling to the extension rod (47).

Step 17:Realign the set screw hole in the body tube (46) with alignment mark scribed on the side of the housing (1) in Step 14.

Step 11:Use a spacer to compress the multiple disc springs enough to draw up tightly these items:

Helical gear (6), thrust switch sleeve (5) and bearing sleeve (4).

The spacer should match the following dimensions of the hub of the drive gear (41):

1. Hub outside diameter.
2. Hub inside bore.
3. Length along hub inside bore.

Step 10: With the bearing plate (31) in place remove the spacer used above and resume assembly the procedure.

When assembling joints with flat gaskets, perform these steps:

Clean and inspect the joint faces for damage.

Apply Permatex Ultra Black sealant to both sides of a new gasket and assemble.

Tighten the fasteners to a low torque: 5-7 ft-lbs for 3/8" bolts and 2-3 ft-lbs for ¼" screws.

Allow to sit for 15 minutes.

Proceeding in an X pattern, torque the fasteners: 17-19 ft-lbs for 3/8" bolts and 5-6 ft-lbs for ¼" screws.

Tighten all bolts evenly, increasing the torque with each tightening cycle until the final torque is reached.

Let the units stand for 8 hours.

Back off the fasteners 30 degrees (1/2 flat).

Retorque the fasteners as before.

After completing reassembly, mounting adjustments can be made by threading the clevis (8) in or out of the extension rod (47). Upon realignment, tighten the jam nut (9) to lock the clevis.

The actuator must be lubricated before being returned to operation. Use the lubricant listed in Table 6. Fill the gear cavity under the recess for the geared position limit switch assembly (52) before reinserting the switch assembly into the housing.

Remove the loctited hex head cap screw (24) in the end cap (3); it may be necessary to heat the end cap near the cap screw. If heat is required, do not exceed 350° F. Temporarily install a grease fitting in the 1/4 - 28 tapped hole. Add the lubricant through this fitting in the amount listed in Table 5.

When lubrication of the area is completed, remove the temporary grease fitting and reinstall the screw (24) after applying Loctite® 242 or equivalent to the screw threads.

Remove the pipe plugs (23) in the bottom and side of the housing. Install lubricant through the bottom opening until lubricant starts to flow out through the side opening. Reinstall pipe plugs.

Lubrication is completed.

Electric Brake

The electric brake (134) provides a positive clamping force to the actuator motor shaft and holds the actuator in position when the motor is off. The high efficiency ball screw is not self-locking and can be back driven by an external load.
Normally, the brake is spring set to prevent motor shaft rotation when electrical power is off and released when the motor is energized. The brake is engaged directly on an extended motor shaft and housed within a cast cover bolted directly to the motor end bell.

Brake Adjustment

Before the air gap "A" reaches .100", adjustment is required. Any delay in adjusting the magnet air gap will result in eventual loss of torque. Refer to Figure 2.

1. To adjust, remove the brake cover to expose square head wear adjusting screws (15H) and expose the magnetic air gap "A".
2. Measure the air gap "A" using 3/8" to 1/2" wide feeler gauge. (Measure at center of magnet.)
3. Turn the two square head wear adjusting screws until the air gap "A" measures:

   .045/.050 for 3'# models
   .050/.055 for 6'# models
   .050/.055 for 10'# models

   Air gap should be the same on both sides.

CAUTION
Do not adjust brakes for higher torques as this will cause premature coil burnout.

ATTENTION
Ne réglez pas les freins sur des couples plus élevés; vous risqueriez de provoquer l'usure prématurée de la bobine.

Manual Brake Release

WARNING
Disconnect all electrical power to the actuator.

AVERTISSEMENT
Débranchez tous les câbles électriques de l'actionneur.

The brake may be released manually to permit manual operation of the actuator for limit switch adjustment or during an electrical power failure.

1. Remove the brake cover and conduit pipe plug from the motor end bell.
2 With a flat head screwdriver inserted into the motor end bell conduit port, turn the release knob (3) clockwise to stop the position to release the brake. The brake will remain released until the release knob is turned counterclockwise (approx. 65°) or until the brake coil is energized, automatically resetting the brake.
3. Use a screwdriver in the slotted motor shaft to rotate the shaft clockwise to extend the actuator extension rod.
4. When the adjustment is completed or power is restored, replace the brake cover and conduit pipe plug securely.

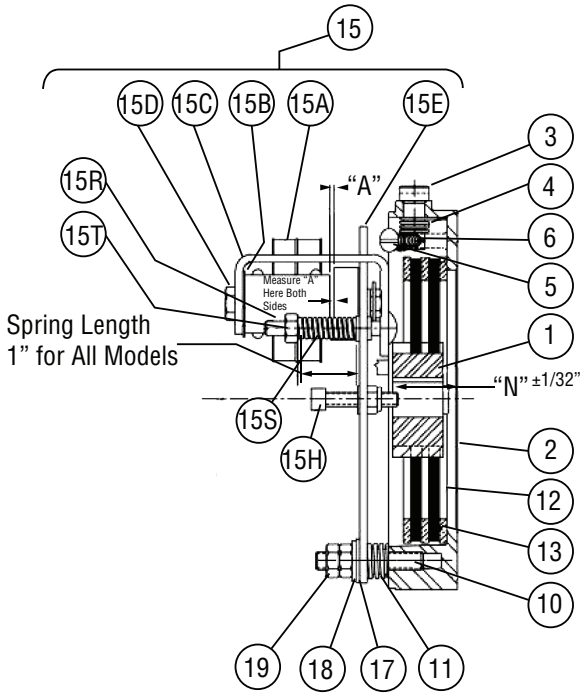


Figure 3 - Electric Brake Drawing

Table 3 - Electric Brake Parts List

Item	Description
1	Splined Hub
3	Release Knob
13	Friction Disc
15H	Wear Adjustment Screw
15S	Spring
15A	Magnet Assembly
45	Terminal Strip (Not shown)

Brake Removal and Replacement

WARNING
Disconnect all electrical power to the actuator.

AVERTISSEMENT
Débranchez tous les câbles électriques de l'actionneur.

CAUTION
BURN HAZARD Possible hot surface. Keep hands clear of surface. Allow surface to cool before performing any maintenance.

ATTENTION

RISQUE DE BRÛLURE

La surface risque de devenir chaude. Éloignez vos mains de la surface. Laissez refroidir la surface avant les travaux de maintenance.

Complete replacement of the electric brake is recommended rather than attempting field repairs.

1. Remove the brake cover from the motor end bell.
2. Disconnect the coil power wires, leading into the actuator motor housing, from the terminal strip.
3. Remove the four socket head cap screws and lockwashers securing the brake assembly to the motor end bell. Remove the entire brake assembly.

Replacement of the brake assembly is done by reversing the above procedure.

Geared Position Limit Switch Adjustment

The geared position limit switches has been preset at the factory according to the specified stroke. However, if the actuator stroke must be readjusted, proceed as follows.

WARNING

Disconnect all electrical power to actuator prior to removing position limit switch compartment cover and performing any setting adjustment.

AVERTISSEMENT

Débranchez tous les câbles électriques de l'actionneur avant d'ôter le couvercle du compartiment de l'interrupteur de fin de course de position et de procéder aux réglages.

1. Remove the position limit switch compartment cover (51) to gain access to the position switch assembly (52).
2. Remove the motor pipe plug (100) for access to slot "A", located in the end of the motor shaft.
3. With a manual or power screw driver, rotate the shaft clockwise to extend the actuator shaft.
4. If the rotor (#36-1) contact fingers are closed, open them by pushing down on the slotted shaft "1" and turning clockwise until the "extend" rotor turns 90° counterclockwise and the shaft is fully extended. If the rotor (#36-1) has turned so the contacts are already open, push and turn the slotted shaft "1" counterclockwise until the rotor turns about 90° and the contacts close. Then push and turn the slotted shaft "1" clockwise until the rotor turns to open the contacts. The rotor is now set to trip and stop the actuator in the fully extended position.
5. After retracting the clevis pin to the desired position by rotating the motor shaft in a counterclockwise direction. Follow the same procedure setting the second rotor (#36-4) except reverse the rotation directions.
6. If the switch assembly has been supplied with four rotors, the additional rotors with their corresponding slotted shafts #2 and #3 are for intermediate tripping points of other electrical circuits. Follow the procedure described in No. 4 to set the additional rotors (#36-2 and #36-3) at the desired clevis pin positions.
7. Make sure the mating surfaces of the cover and housing are clean. Replace the compartment cover, gasket (60) and secure them tightly in place with the hardware (53 and 54).
8. Replace the motor pipe plug tightly.
9. Reconnect all electrical power to the actuator.

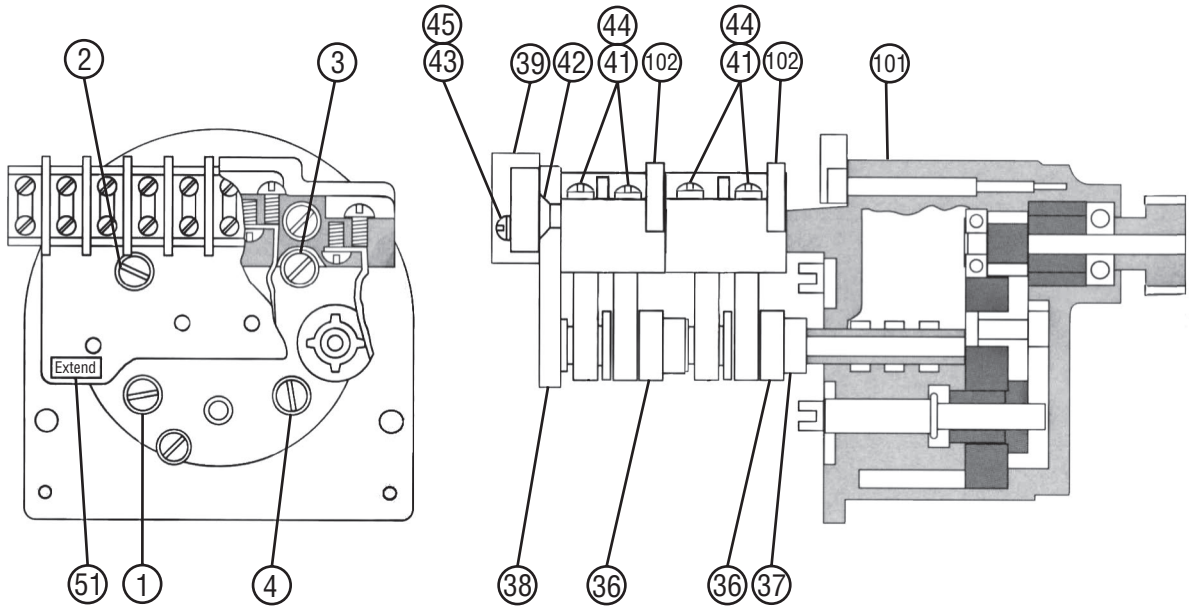


Figure 4 - Geared Position Limit Switch Parts Drawing

Table 4 - Geared Position Limit Switch Parts List

Item	Description
1-4	Slotted Adjustment Shaft
36	Rotor Sub- Assembly
37	Rotor Driver
38	Rotor Plate
39	Terminal Block
41	Fillister Head Machine Screw
42	Flat Head Machine Screw
43	Socket Head Machine Screw
44	Hi-Collar Lockwasher
45	Lockwasher
51	Decal-Extend
101	Gear Frame Sub-Assembly
102	Finger Base Sub-Assembly

Thrust Limit Switch Setting Procedure

The thrust switches have been preset at the factory according to the information provided by the customer. However, for field adjustment to decrease or increase the thrust force that will trip the thrust limit switches to interrupt the electric circuit to the motor, follow the procedure below.

WARNING

Disconnect all electrical power to actuator prior to performing any thrust limit switch adjustment.

AVERTISSEMENT

Débranchez tous les câbles électriques de l'actionneur avant de procéder aux réglages de l'interrupteur de fin de course à pousser.

WARNING

MOVING PARTS

Internal moving parts. Pinch point hazard. Keep hands clear during operation.

AVERTISSEMENT

PIÈCES MOBILES

Pièces mobiles internes. Risque de point de pincement. Tenez vos mains éloignées pendant le fonctionnement.

1. Remove the thrust limit switch compartment cover (65) to gain access to the thrust switch assembly (66).
2. To set the thrust load tripping point for the extend or retract direction strokes, loosen the screw (19) and move the appropriate pointer (3) to the desired thrust setting. The higher the number, the higher the thrust output of the actuator.
3. Re-tighten the screw.
4. Make sure the mating surfaces of the cover and the housing are clean. Replace the compartment cover and gasket (61) and secure them tightly in place with the hardware (69 and 70).
5. A maximum stop setting is furnished on all actuators. DO NOT EXCEED THIS SETTING WITHOUT CONSULTING THE FACTORY.

Table 5 - Thrust Limit Switch Parts List

Item	Description
1	Thrust Switch Base
2	Thrust Switch Arm
3	Pointer
4	Adjusting Arm
5	Thrust Switch Dial
6	Thrust Switch Bushing
7	Bearing Lever
8	Bearing Lever Pin
9	Torsion Spring
10	Insulator
11	Thrust Switch Shaft
12	Thrust Switch Limiter Plate
13	Thrust Washer
14	Microswitch
15	O-Ring
16	O-Ring
17	Ball Bearing
18	Socket Head Machine Screw
19	Socket Head Machine Screw
20	Socket Head Machine Screw
21	Socket Set Screw
22	Hex Nut
23	Hi-Collar Lockwasher
24	Groove Pin
25	Groove Pin
26	Decal-Extend
27	Decal-Retract
29	Lockwasher

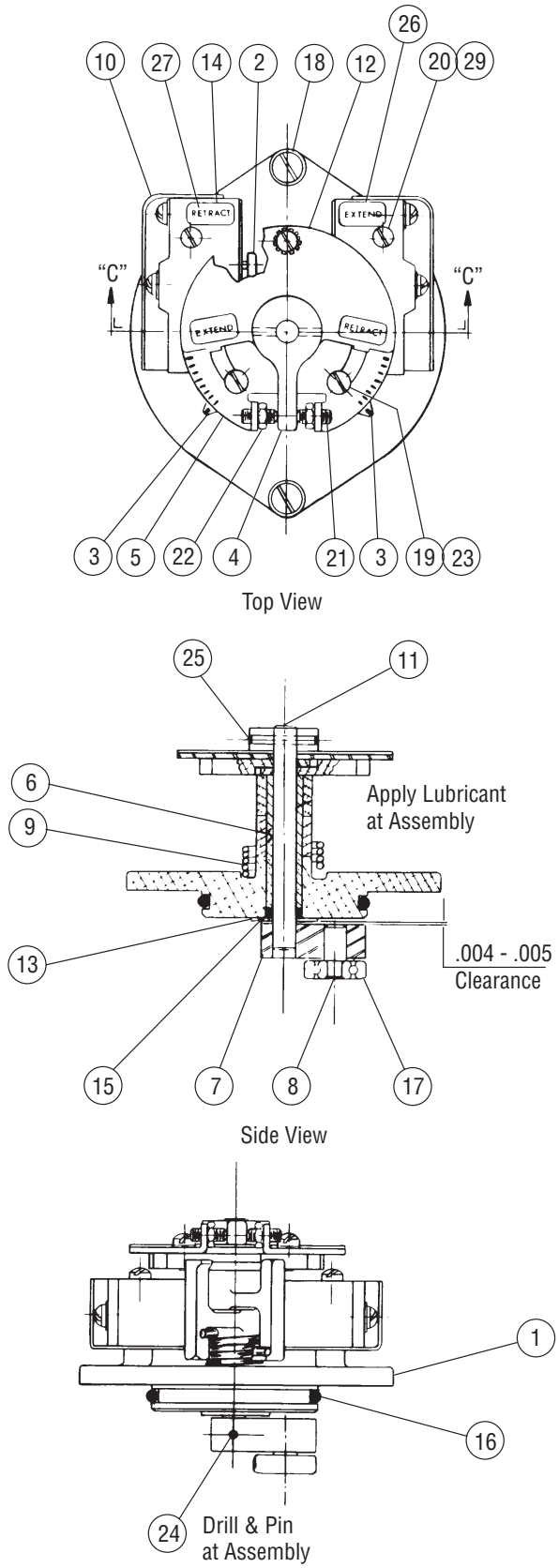


Figure 5 - Thrust Limit Switch Parts Drawing

Lubrication Instructions

Every Posi-Tork® Linear Actuator has been lubricated at the factory and should not require lubrication if operated at the published duty cycle, thrust rating and in appropriate environmental conditions. Good preventative maintenance practice should be performed at six-month intervals. The lubricant should be inspected to verify proper consistency and quality. The inspection can be made by removing the pipe plug (23) located in the side of the housing (1). After completing a satisfactory inspection, tightly replace the pipe plug. If lubricant level is low or visibly contaminated, the actuator should be further inspected to determine the cause.

The amount of lubricant in each actuator depends on the size and stroke of the actuator. See Table 4.

Standard lubricants for use in the actuator are shown in Table 5. Substitute lubricants are listed in Table 5A.

Table 6 - Lubricant Required per Actuator Size and Stroke

Actuator Lubricant Amount, Pounds					
Stroke (Inches)	7100 ACME	7200 ACME	73-7200 ACME	7300 ACME	74-7300 ACME
6	.50	.75	1.25	1.25	1.50
12	.75	1.25	2.00	2.00	2.25
18	1.00	1.75	2.75	2.75	3.25
24	1.25	2.00	3.50	3.50	4.25
30	—	2.25	4.25	4.25	5.25
36	—	2.75	5.00	5.00	6.25
46	—	—	6.50	6.50	8.00
60	—	—	8.00	8.00	10.00

Acceptable Lubricants

Standard lubricants and acceptable substitutions for use in the actuator in Table 3.

Table 7 - Standard and Substitute Lubricants

Recommended	Manufacturer
AeroShell Grease 6	Shell Oil Products
Substitute	**Manufacturer**
Lubriplate MAG-1	Fiske
Litholene HEP1	ARCO
Mobilux EP1	Mobil
Gulfcrown EP1	Gulf

Optional Equipment

Dust-Ignition Proof Enclosure Hazardous Locations Class II Division I, Groups E, F & G

Actuators that comply with the NEC specification must have electrical access covers that exclude ignitable amounts of dust. When reinstalling these covers, ensure the mating seating surfaces and gaskets are clean and the attachment bolts are securely tightened. If the motor end bell pipe plug has been removed to adjust the actuator, the pipe plug must be reinstalled tightly. The actuator must be able to operate at full rating without developing high enough surface temperatures to cause excessive dehydration or gradual carbonization of organic dust deposits on the actuator enclosure. The motor thermal overload switch must be wired as shown and noted in the electrical wiring diagram provided with the actuator.

	WARNING
	GROUNDING LUG Unit must be grounded with minimum size 10 AWG wire.

	AVERTISSEMENT
	PATTE DE MISE À LA TERRE L'unité doit être mise à la terre avec un fil de calibre 10 au moins.

The grounding lug on the actuator enclosure exterior must be wired to a suitable grounding system with a minimum of #10 AWG wire as noted in the electrical wiring diagram provided.

Gear Driven Potentiometer

This option enables the actuator to provide a continuous linear output signal directly proportional to its stroke. The signal can be interfaced with automatic control equipment to position or sense the actuator at any desired stroke position between fully extended and fully retracted. The potentiometer assembly is mounted directly to, and driven by the geared position limit switch. Input gearing to the potentiometer accommodates the full range of actuator strokes. The potentiometer has been factory adjusted so the 0 and 1000 ohm resistance points correspond respectively, to the fully extended and fully retracted rod positions. Field adjustments may be made by loosening the set screw in the drive pinion on the potentiometer shaft, rotating the shaft as required and retightening the set screws.

Limit Switch Compartment Heater

An optional space heater mounted within the geared position limit switch compartment is available for several ambient applications. The heater is powered by 120 VAC. The input voltage is continuous unless externally interrupted.

Integral Motor Starter

For information concerning the motor starter and any other related control components provided, refer to the electrical wiring diagram provided with the actuator.

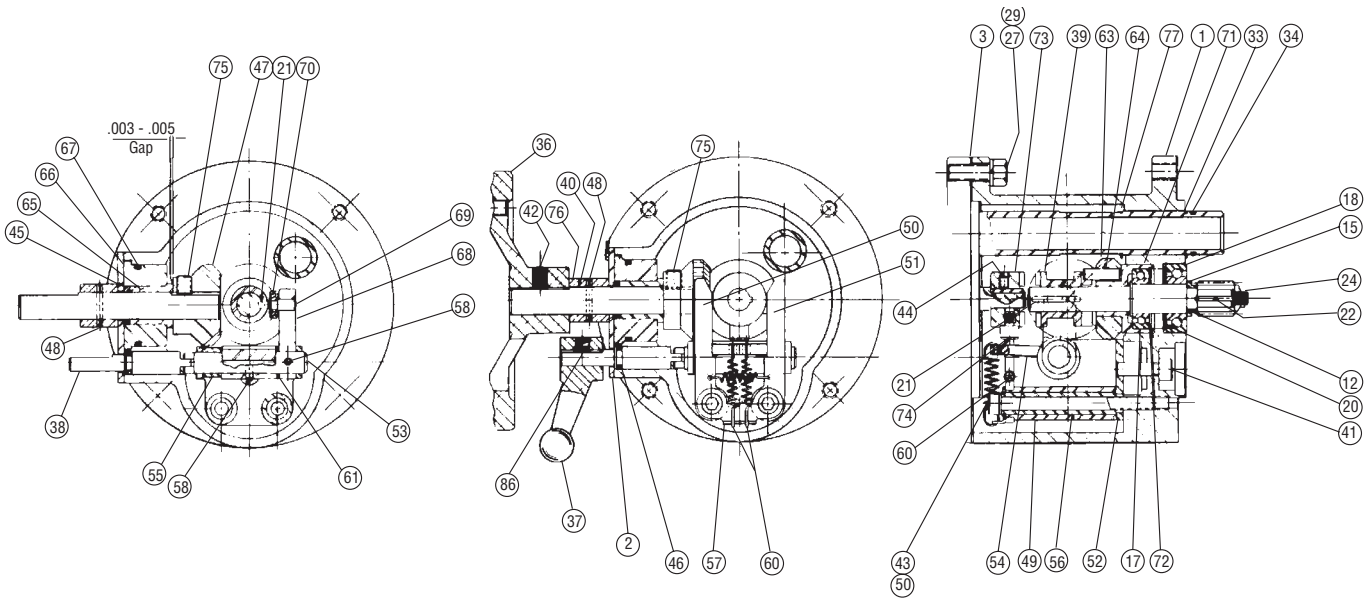


Figure 6 - Manual Handwheel Clutch Assembly Parts Drawing

Table 8 - Manual Handwheel Clutch Assembly Parts List

Item	Description
1	Housing
2	Cover Plate
3	Motor Gasket
12	Drive Shaft
15	Collar
17	Bearing
18	Bearing
20	Bearing Spring
21	Round End Key
22	Key
24	Pinion Locknut (where applicable)
27	Hex Head Cap Screw
29	Lockwasher

Item	Description
33	Retaining Ring
34	O-Ring
36	Handwheel
37	Declutch Lever
38	Declutch Shaft
39	Clutch
40	Handwheel Shaft
41	Socket Head Cap Screw
42	Set Screw
43	Socket Head Cap Screw
45	Quad Ring
46	Quad Ring
47	Handwheel Shaft Gear
48	Spring Pin

Item	Description
49	Tipper Holder
50	Tripper #1
51	Tripper #2
52	Clutch Bracket
53	Fork Shaft
54	Latch
55	Fork Spacer
57	Bridge
58	Spring Pin
60	Fork Springs
61	Thrust Washer
63	Clutch Gear
64	Dowel Pin
65	Flanged Bearing

Item	Description
66	Handwheel Shaft Plug
67	O-Ring
68	Shifter
69	Bearing Lever Pin
70	Bearing
71	Bearing Cartridge
72	Retaining Ring
73	Motor Clutch
74	Tripper Pin
75	Set Screw
76	Bushing
77	Retaining Ring
80	Lockwasher
86	Set Screw

Manual Handwheel Clutch Assembly

The manual handwheel clutch assembly permits manual operation of the linear actuator during installation, adjustments and during an electrical power failure. The handwheel clutch assembly is readily engaged for handwheel operation and will automatically disengage from the handwheel and re-engage to the electric motor when electric power is restored.

In normal electrical operation, the declutch lever (37) is to the left and the clutch (39) is held in engagement with the motor clutch (73) by the pull of the fork springs (60) on the latch (54), which spreads trippers #1 and #2, (50) and (51), away from the motor clutch. The latch is pinned (58) to the fork shaft (53) as is shifter (68). The bearing (70), mounted in the shifter, bears against the shoulder of the clutch, closest to the motor clutch. Lugs on both clutches engage one another to transmit the motor power through the key (21) to the drive shaft (12).

For manual operation, rotate the declutch lever counter-clockwise until a definite "click" is felt. This is the result of the latch being rotated upward between the two spring loaded trippers and past the locking notches in the trippers.

NOTE: When the latch is engaged in the tripper locking notches, the declutch lever cannot be manually rotated clockwise. DO NOT ATTEMPT TO FORCE IT!

The declutch lever rotation also turns the fork shaft and shifter to slide the clutch along the drive shaft, out of the engagement with motor clutch lugs, into engagement with clutch dowel pin (64). Should the declutch lever fail to stay locked in the manual operation position, rotate the handwheel (36) slightly, in either direction, to clear the sliding restriction caused by the clutch lugs aligning with the gear pins and preventing proper engagement. With the clutch properly locked in position, the actuator can be operated by rotating handwheel clockwise to extend the rod and counterclockwise to retract the rod. The actuator will remain in manual operation until the motor is energized.

WARNING

Disconnect all electrical power to the actuator before disassembly.

AVERTISSEMENT

Débranchez tous les câbles électriques de l'actionneur avant le démontage.

WARNING

PPE

Approved Personnel Protective Equipment for the site must be worn.

AVERTISSEMENT

EPI

Il convient de porter un équipement de protection individuelle sur le site.

WARNING

MOVING PARTS

Internal moving parts. Pinch point hazard. Keep hands clear during operation.

AVERTISSEMENT

PIÈCES MOBILES

Pièces mobiles internes. Risque de point de pincement. Tenez vos mains éloignées pendant le fonctionnement.

CAUTION

SERVICE PERSONEL

Service operators must be licensed/trained and authorized before being allowed to perform maintenance on the actuator.

ATTENTION

PERSONNEL DE MAINTENANCE

Les opérateurs de maintenance doivent être licenciés/formés et agréés avant de pouvoir effectuer des travaux de maintenance sur l'actionneur.

CAUTION

LIFTING HAZARD

Single person lift could cause injury.
Use assistance when moving or lifting.

ATTENTION

RISQUE LIÉ AU LEVAGE

Le levage de l'unité par une seule personne est dangereux.
Demandez de l'aide lors du déplacement ou du levage de l'unité.

Removal & Replacement

1. Remove all the hex head cap screws (53) and associated lockwashers (54). Remove the limit switch compartment cover (51) from the actuator assembly.
2. Remove all the hex head cap screws (69) and associated lockwashers (70). Remove the thrust switch compartment cover (65) from the actuator assembly.
3. Disconnect all electrical power leads to the motor (30). Remove all the carriage bolts and associated lockwashers. Remove the motor end bell then the motor assembly from the actuator.
4. Remove the handwheel clutch assembly from the actuator.

NOTES:

1. Refer to the actuator assembly drawing in Figure 3, page 12, for the procedure listed above.
2. To replace the handwheel clutch assembly, use the procedures listed above in reversed order.
3. When assembling joints with flat gaskets, perform these steps:

   Clean and inspect the joint faces for damage.

   Apply Permatex Ultra Black sealant to both sides of a new gasket and assemble.

   Tighten the fasteners to a low torque: 5-7 ft-lbs for 3/8" bolts and 2-3 ft-lbs for ¼" screws.

   Allow to sit for 15 minutes.

   Proceeding in an X pattern, torque the fasteners: 17-19 ft-lbs for 3/8" bolts and 5-6 ft-lbs for ¼" screws.

   Tighten all bolts evenly, increasing the torque with each tightening cycle until the final torque is reached.

   Let the units stand for 8 hours.

   Back off the fasteners 30 degrees (1/2 flat).

   Retorque the fasteners as before.

Dissassembly

1. Shift the declutch lever (37) to the manual position.
2. Restrain the drive shaft (12) from rotating by holding the handwheel (36) and remove the pinion locknut (24).
3. Loosen the set screw (42) and remove the handwheel.
4. Loosen the set screw (86) and remove the declutch lever.
5. Remove the cover plate screws.
6. Withdraw the handwheel shaft assembly including the spring pin (48), bushing (76), cover plate (2), quad ring (45), handwheel (36), shaft plug (66), o-ring (67), flanged bearing (65), handwheel shaft gear (47) with associated set screw (75).
7. Withdraw the declutch shaft (38) with quad ring (45).

8. Remove the trippers and fork springs (60).
9. Remove the cap screws (41 and 43) and the associated lockwasher (80). Rotate the clutch shifter sub-assembly clockwise to disengage the bearing (70) from the clutch (39) and remove the clutch shifter sub-assembly from the housing (1).
10. Slide the clutch off drive shaft (12) and remove the round ended key (21).
11. Remove the key (22) and gear from the locknut end of the drive shaft.

NOTES:

1. Often times the handwheel clutch assembly is provided with a drive shaft having gear teeth machined into it. Disregard Steps 2 and 11 if this type of drive shaft is present in your sub-assembly.
2. Refer to the parts list on page 13 for all drive shafts and gears available.

12. Remove the collar (15) or snap ring from the locknut end of the drive shaft.
13. Withdraw the drive shaft with the clutch gear (63), dowel pin (64) and bearing cartridge (71). Remove the bearing (18).

Reassembly is done by reversing the disassembly procedure. Upon completion of reassembly, liberally grease all sliding and rotating components before reinstalling the manual handwheel clutch assembly to the actuator.

When assembling joints with flat gaskets, perform these steps:

Clean and inspect the joint faces for damage.

Apply Permatex Ultra Black sealant to both sides of a new gasket and assemble.

Tighten the fasteners to a low torque: 5-7 ft-lbs for 3/8" bolts and 2-3 ft-lbs for ¼" screws.

Allow to sit for 15 minutes.

Proceeding in an X pattern, torque the fasteners: 17-19 ft-lbs for 3/8" bolts and 5-6 ft-lbs for ¼" screws.

Tighten all bolts evenly, increasing the torque with each tightening cycle until the final torque is reached.

Let the units stand for 8 hours.

Back off the fasteners 30 degrees (1/2 flat).

Retorque the fasteners as before.

If your actuator includes a gear box assembly, it has been selected based on specific conditions of stroke velocity and/or thrust. The gear box assembly is always mounted directly to the actuator housing.

Disassembly & Reassembly of the Gear Box Assembly

WARNING

Disconnect all electrical power to the actuator.

AVERTISSEMENT

Débranchez tous les câbles électriques de l'actionneur.

WARNING

PPE

Approved Personnel Protective Equipment for the site must be worn.

AVERTISSEMENT

EPI

Il convient de porter un équipement de protection individuelle sur le site.

WARNING

MOVING PARTS

Internal moving parts. Pinch point hazard. Keep hands clear during operation.

AVERTISSEMENT

PIÈCES MOBILES

Pièces mobiles internes. Risque de point de pincement. Tenez vos mains éloignées pendant le fonctionnement.

CAUTION

SERVICE PERSONEL

Service operators must be licensed/trained and authorized before being allowed to perform maintenance on the actuator.

ATTENTION

PERSONNEL DE MAINTENANCE

Les opérateurs de maintenance doivent être licenciés/formés et agréés avant de pouvoir effectuer des travaux de maintenance sur l'actionneur.

CAUTION

LIFTING HAZARD

Single person lift could cause injury.
Use assistance when moving or lifting.

ATTENTION

RISQUE LIÉ AU LEVAGE

Le levage de l'unité par une seule personne est dangereux.
Demandez de l'aide lors du déplacement ou du levage de l'unité.

1. Remove the position and torque limit switch compartment covers (51 and 65).
2. Disconnect the electrical power leads to the motor, remove the four fasteners retaining motor end bell and stator and remove the motor components including the rotor and all mounted parts, by withdrawing straight out.
3. Remove the gear box assembly from the actuator.
4. Ensure the bearing (16), supported in the motor end of the housing, is retained with the first set gear shaft (5).
5. The entire first set gear shaft with all the mounted gears and spacers can be drawn straight out of the housing (1).
6. For Model 7200 Actuators: Remove the flexlocnut (35), retaining output pinion (13), pinion spacer (15) and key (23).

6a. For Model 7300 Actuators: Remove the housing adapter (30) by removing the screw (31).

7. For Model 7200 Actuators: Slide the drive shaft through the support bearing (17) and out of the housing.

7a. For Model 7300 Actuators: Remove the flexlocnut (24), retaining second set gear (9) and the key (22). Slide the second set gear off the drive shaft (12).

Reassembly is done by reversing the above procedure. When reinstalling the gear box assembly on the actuator, remove the cover plate (2) to guide the first set gear shaft into the bearing. After reinstallation on the actuator, fill the housing completely with the appropriate lubricant , as shown on page 11, and replace the cover plate and cover plate gasket (4).

When assembling joints with flat gaskets, perform these steps:

Clean and inspect the joint faces for damage.

Apply Permatex Ultra Black sealant to both sides of a new gasket and assemble.

Tighten the fasteners to a low torque: 5-7 ft-lbs for 3/8" bolts and 2-3 ft-lbs for ¼" screws.

Allow to sit for 15 minutes.

Proceeding in an X pattern, torque the fasteners: 17-19 ft-lbs for 3/8" bolts and 5-6 ft-lbs for ¼" screws.

Tighten all bolts evenly, increasing the torque with each tightening cycle until the final torque is reached.

Let the units stand for 8 hours.

Back off the fasteners 30 degrees (1/2 flat).

Retorque the fasteners as before.

Table 9 - Gear Box Assembly Parts List

Item	Description
1	Housing
2	Cover Plate (Not shown)
3	Motor Gasket
4	Cover Gasket (Not shown)
5	First Set Gear Shaft
6	Support Washer
7	Spacer
8	Set Pinion
9	Second Set Gear
10	Set Pinion
11	Set Gear
12	Drive Shaft
13	Output Pinion
15	Pinion Spacer
16	Ball Bearing
17	Ball Bearing
18	Ball Bearing
19	Bearing Spring
20	Spacer
21	Spacer End Key
22	Square Key
23	Square Key
24	Flexlocnut
27	Hex Head Cap Screw
29	Spring Lockwasher
30	Housing Adapter
31	Screw
32	Conduit Bushing
33	Retaining Ring
34	O-ring
35	Flexlocnut (Not shown)

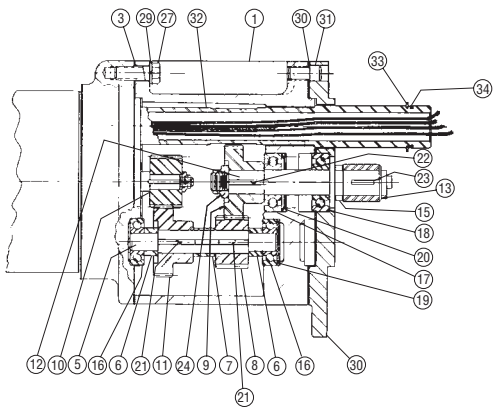


Figure 7 - Gear Box Assembly Parts Drawing

Table 10A - Trunnion Mounting

Series	TA	TB	TC	TD	TE	TF	TG	TH	TJ	TK
7100-A	0.63	3.50	0.50	4.00	1.88	0.53	0.75	4.75	7.47	9.25
7200-A	0.63	3.50	0.50	4.00	1.88	0.53	0.75	4.75	7.47	9.25
7300-A	0.75	4.66	0.87	7.56	5.50	0.66	1.19	6.50	9.50	11.25
74-7300-A	0.75	4.66	1.00	7.56	5.50	0.66	1.43	7.50	10.50	12.25

Table 10B - "T" Dimensions (Shown with Actuator Fully Retracted

Series	6" Stroke		12" Stroke		18" Stroke		24" Stroke		30" Stroke		36" Stroke		48" Stroke		60" Stroke	
	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX
7100-A	6.63	7.63	11.63	13.63	16.63	19.63	19.63	25.63	–	–	–	–	–	–	–	–
7200-A	6.63	7.63	11.63	13.63	16.63	19.63	19.63	25.63	25.63	31.63	31.63	37.63	–	–	–	–
7300-A	10.00	11.50	13.50	17.50	17.00	23.50	21.00	29.50	26.00	35.50	32.00	42.50	38.00	53.50	44.00	65.50
74 -7300-A	12.00	14.25	17.00	20.25	20.00	26.25	23.00	32.25	26.00	38.25	32.00	44.25	38.00	56.25	44.00	68.25

Notes

1. An adjustable trunnion mount is standard on 7200, 7300, and 74-7300 Series actuators (optional on 7100).
   For 7400 Series ball screw actuators with an adjustable trunnion mount use "T" dimension from the 7400 flange mount table. Fixed location trunnion pins are standard on 7400 and 7500 Series actuators.
2. Trunnion brackets are optional on all models.
3. Actuators supplied with adjustable trunnion mounting are set at the maximum dimension unless otherwise specified.
4. Dimensions are for reference only. Contact Dresser Natural Gas Solutions for engineering drawings.

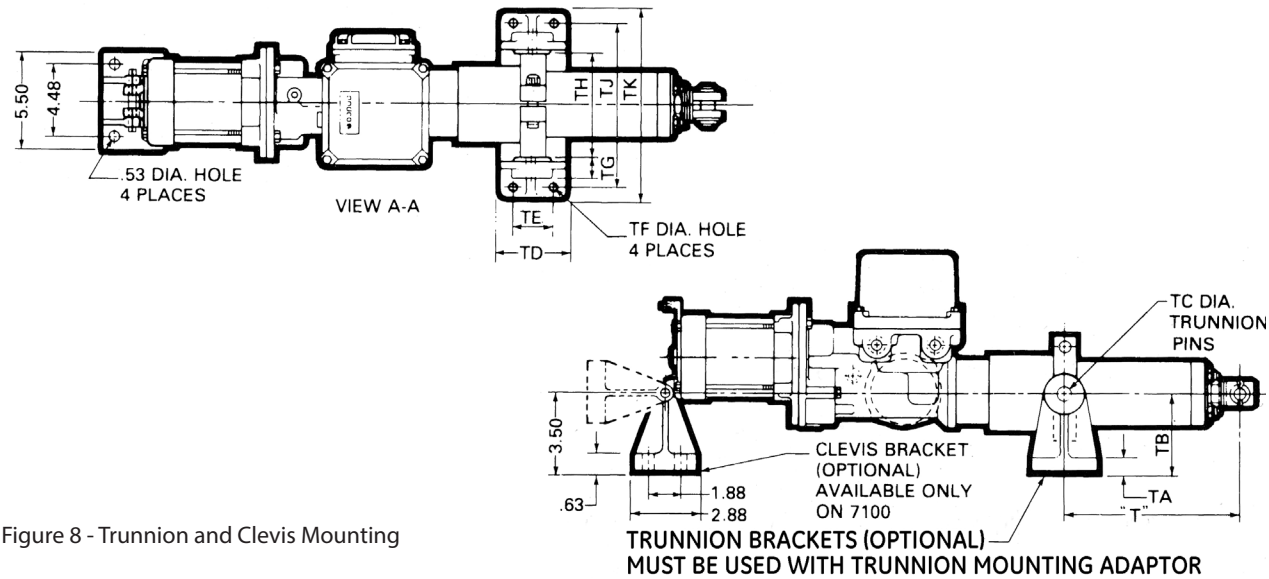


Figure 8 - Trunnion and Clevis Mounting

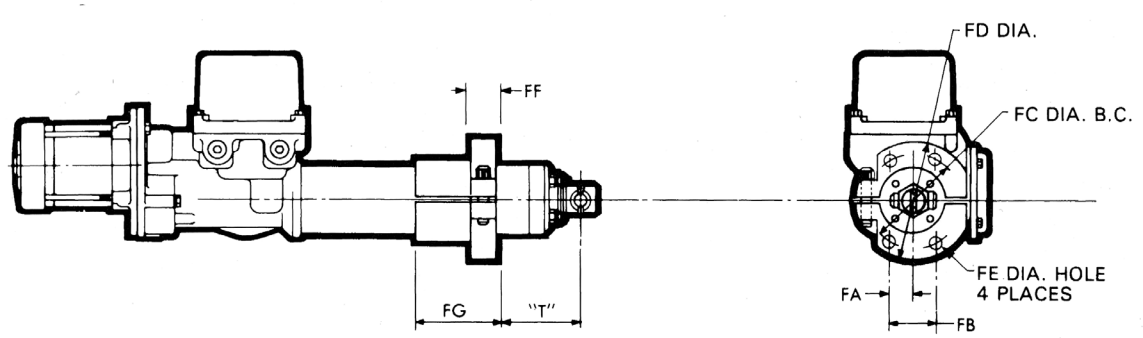


Figure 9 - Face/Flange Mounting

Table 11A - Face/Flange Mounting

Series	FA	FB	FC	FD	FE	FF	FG
7100-A	1.00	2.00	4.25	5.50	0.56	1.00	4.00
7200-A	1.00	2.00	4.25	5.50	0.56	1.00	4.00
7300-A	1.50	3.00	5.75	7.00	0.69	1.38	4.00
74-7300-A	2.25	4.50	6.50	8.00	0.81	1.00	5.00

Table 11B - "T" (Shown with Actuator Fully Retracted)

Series	6" Stroke		12" Stroke		18" Stroke		24" Stroke		30" Stroke		36" Stroke		48" Stroke		60" Stroke	
	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX
7100-A	3.32	6.75	3.32	12.75	6.63	18.75	12.63	24.75	–	–	–	–	–	–	–	–
7200-A	3.32	6.75	3.32	12.75	6.63	18.75	12.63	24.75	18.63	30.75	24.63	36.75	–	–	–	–
7300-A	10.00	11.00	16.00	17.00	22.00	23.00	28.00	29.00	34.00	35.00	40.00	41.00	52.00	53.00	64.00	65.00
74 -7300-A	11.00	13.25	17.00	19.25	23.00	25.25	29.00	31.25	35.00	37.25	41.00	43.25	53.00	55.25	65.00	67.25

Notes

1. Face/flange actuator may be rotated 90° from arrangement shown.
2. Face/flange location is set at maximum dimension unless otherwise specified.
3. Dimensions are for reference only. Contact Dresser Natural Gas Solutions for engineering drawings.

High Potential Test

1. Do not apply this test to units equipped with motor control cards. Tests which involve putting electrical power to units equipped with motor control cards are covered by a separate procedure.
2. Select the voltage setting for the appropriate motor voltage as indicated on nameplate. Set the selected test equipment to the selected volts.
3. With the test equipment ground wire contacting the gear case plate, contact each test point shown on wiring diagram. The actuator shall be capable of withstanding for one second per test point, without breakdown, the applied voltage from Table 1.

Table 12 - HIPOT Testing Specifications

Circuit Voltage	Test Duration/ Test Point	Test Voltage (AC) setting	Max Acceptable Leakage
12 VDC	One Second	1000 Volts	10.33 mA
24 VDC	One Second	1000 Volts	10.33 mA
120 VAC 1PH	One Second	1200 Volts	10.33 mA
220 VAC 1PH	One Second	1200 Volts	10.33 mA
220 VAC 3PH	One Second	1200 Volts	10.33 mA
460 VAC 3PH	One Second	1200 Volts	10.33 mA
575 VAC 3PH	One Second	1200 Volts	10.33 mA

Note:

Motor power circuits are to be tested based on the motor voltage (AC). Dielectric strength tests may be made by applying a direct current (DC) voltage instead of an alternative current (AC) voltage, provided that the voltage used is 1.414 times the values specified above. See wiring diagram for test points.

Ground Continuity

1. Verify continuity between actuator ground lug and ground.

Functional Test

1. Electrically energize the actuator.
2. Drive the actuator over the full range of motion.

Andco 7000 Series Technical Specifications				
Temperature Rating	-40 to 140°F			
	-40 to 60°C			
	20% Relative Humidity @ 40°C			
Electrical Ratings		US/Canadian Installations		
	Motors	Voltage	Current (FL)	Frequency
	7102S, 7202S, 7302S	120V 1Ph	5.0A	60HZ
	7105T, 7205T, 7210T, 7310T	230V 3Ph	6.0A	60HZ
		380V 3Ph	3.0A	50HZ
		460V 3Ph	3.0A	60HZ
		575V 3Ph	2.4A	60HZ
	7317T, 7324T	230V 3Ph	8.0A	60HZ
		380V 3Ph	4.2A	50HZ
		460V 3Ph	5.2A	60HZ
		575V 3Ph	3.5A	60HZ
Motors	Class F Insulation			
	Internal Thermal Switch (130°C)			
	NEMA D Design			
Duty Cycle	25%			
Certifications - North America	C2D1 Groups E,F,&G Dust Ignition Proof, T4A			
	Type 4 Watertight			
	CSA Certificate	US Certificate		
	CSA C22.2 No. 0	ANSI/UL 61010-1		
	CSA C22.2 No. 25	UL50 & UL50E		
	CSA C22.2 No. 94	FM 3600		
	CSA C22.2 No. 142	FM 3616		
Mounting Types	Clevis & pin on drive rod end			
	Clevis mount on motor end			
	Trunnion (adjustable)			
	Face/Flange (Adjustable)			
Control & Position Cards	Positran V051 (4-20ma)			
	SCC05 Modbus (US only)			
	SCC10 (US only)			
	ACT-100 w/Modbus			
Weight	50 - 625 lbs dependent of model, length of extension rod & options			
Options	Oversize Clevis			
	Manual Overirde			

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