

Andco Series 7000 Actuator

Posi-Tork* Acme Screw

Instruction Manual



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imagination at work

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 and long term actuator operation. Please carefully read and thoroughly understand the context 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 GE Oil & Gas toll free at 1-800-945-9898, 832-590-2306 or e-mail us at andcoactuator.inquiries@ge.com. Be sure to mention the model and serial number when requesting information.

General

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. Actuators for indoor dust-ignition proof service MUST be stored indoors.
2. If outdoor storage cannot be avoided, the actuator must be stored high enough to avoid immersion in snow or water.
3. Compartment heaters (optional) 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.

Model Number Identification

Your 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 can be performed by unauthorized personnel.

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 attachments to the mounting support 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 9 and the electrical wiring diagram on page 4).
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.

8. Readjust the geared position limit switches before operating the actuator if the switch assembly has been removed from actuator. (Refer to Geared Position Limit Switch Adjustment instructions on page 9 and the electrical wiring diagram on page 4).

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 diagrams Figures 1 and 2 on page 4 and 5). This could cause serious damage to the actuator or the driven equipment.

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.

Motor Operation

The electric motor (30) has a pinion mounted on it's shaft. This pinion (40) and the drive gear (41) are 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 3, page 6, and Table 1, page 7.

The drive nut is held from rotating by four tie rods (48). Rotation of the drive screw causes an axial movement on 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 bearing sleeve (4) to rotational movement of the lever of thrust switch (66). The thrust switch will interrupt the electric circuit to the motor for both the extend or retract stroke.

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.

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.

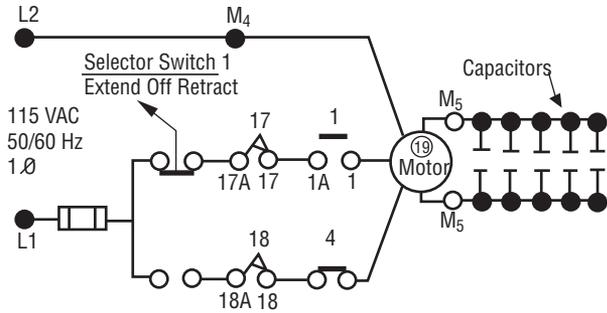
Refer to the Geared Position Limit Switch Adjustment instructions on page 9.

Thrust Limit Switch Operation

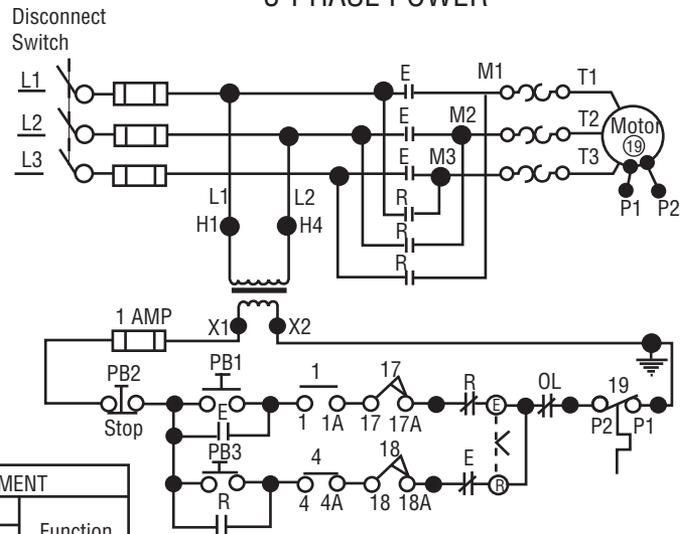
The factory preset thrust switch assembly protects the actuator and driven equipment from mechanical overloads. Th thrust switch has a dial with pointer type settings which can be field adjusted to increase or decrease the thrust load. The higher the number setting on the thrust switch, the higher the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

Refer to the Thrust Limit Switch Setting Adjustment instructions on page 10.

SINGLE PHASE POWER



3-PHASE POWER



Rotor	Contact	GEARED LIMIT SWITCH CONTACT DEVELOPMENT			Function
		ACTUATOR POSITION			
		Fully Retracted	Intermediate	Fully Extended	
Extend	1	—	—	—	Full Extend Position
	4	—	—	—	Indicating Light
Inter-mediate	2	—	—	—	Spare
	6	—	—	—	Spare
Inter-mediate	3	—	—	—	Spare
	7	—	—	—	Spare
Retract	4	—	—	—	Full Retract Position
	8	—	—	—	Indicating Light

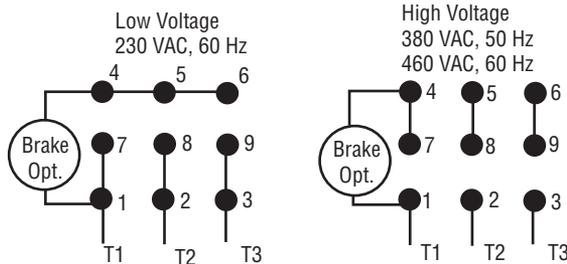
ACTUATOR SHOWN IN FULLY EXTENDED POSITION

— Switch Contact Closed - - - - - Switch Contact Open

- ⑰ Extend thrust switch interrupts control circuit if mechanical overload occurs during extend cycles.
 - ⑱ Retract thrust switch interrupts control circuit if mechanical overload occurs during retract cycles.
- Trip points of contacts 2, 6, 3, & 7 are adjustable between the fully retract and fully extended positions.
Contacts on each rotor can be arranged for identical operation.

LEGEND

- – Switch Contacts
- – Wiring Connections
- ① – Extend Position Limit Switch
- ④ – Retract Position Limit Switch
- ⑰ – Extend Thrust Limit Switch
- ⑱ – Retract Thrust Limit Switch
- ⑲ – Thermal Overload
- OL – Overload Relay
- ⓔ – Extend Coil
- Ⓡ – Retract Coil
- ⌘ – Mechanical Interlock
- PB – Pushbutton
- – Fuses or Circuit Breakers
- ⏏ – Disconnect Switch



3-PHASE MOTOR CONNECTIONS

Note:

1. Thermal wires, P1 and P2, must be wired to motor starter coils for Class II, Division 1, Groups E, F, and G enclosure

Figure 1 - Wiring of Motor and Optional Electric Brake

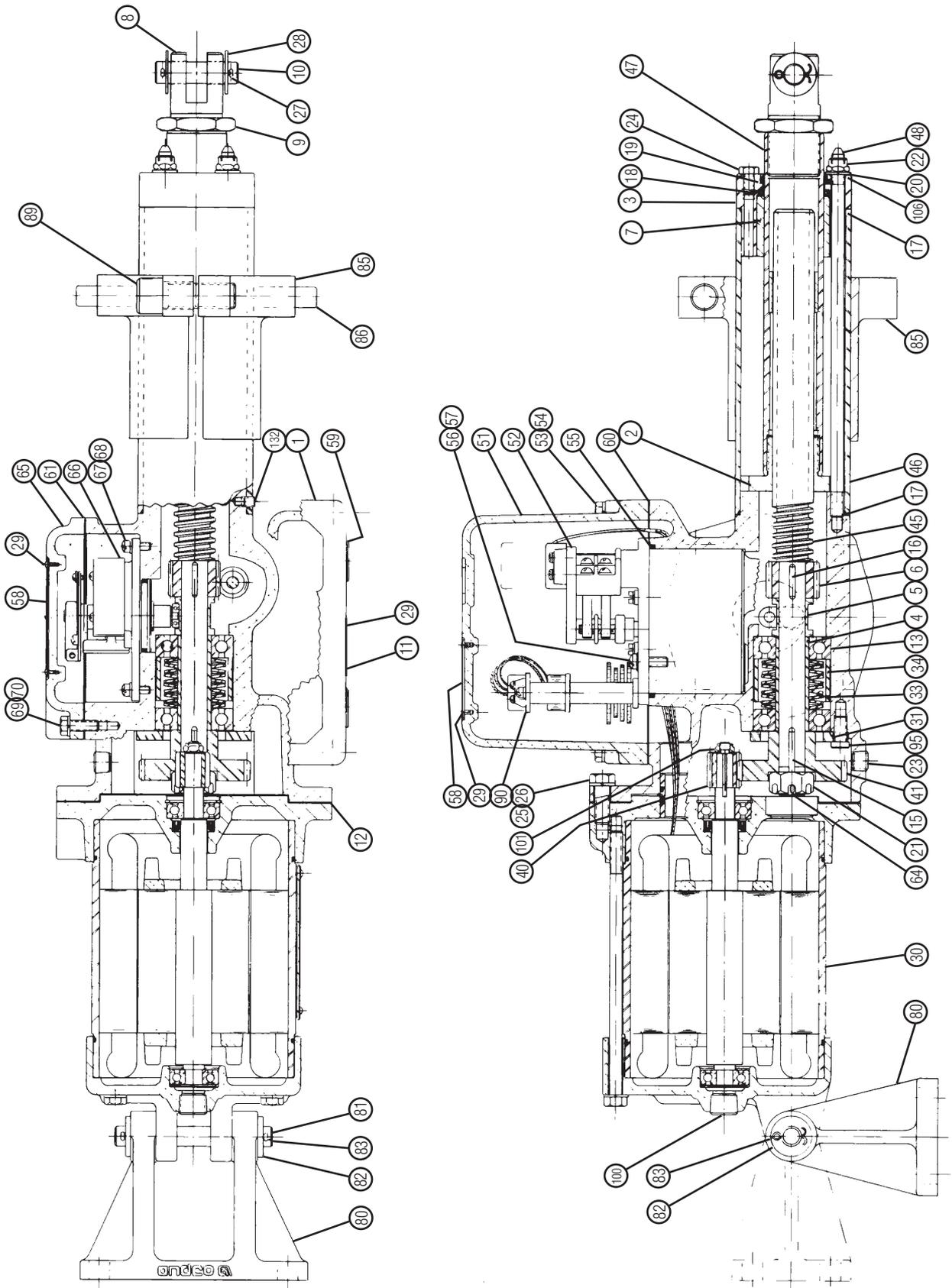


Figure 3 - Acme Screw Actuator Parts Drawing

Table 1 - ACME Screw Actuator Parts List

Item	Description	Item	Description	Item	Description	Item	Description
1	Body Housing	20	Thread Seal or O-ring & Washer	47	Extension Rod	67	Socket Head Machine Screw
2	Drive Nut	21	Slotted Hex Nut	48	Tie Rod	68	Internal Tooth Lockwasher
3	End Cap	22	Flexlocnut	51	Limit Switch Compartment Cover	69	Socket Head Cap Screw
4	Bearing Sleeve	23	Pipe Plug	52	Gear Limit Switch Assembly	70	Lockwasher
5	Thrust Switch Sleeve	24	Hex Head Cap Screw	53	Socket Head Cap Screw	80	Knife Mounting Bracket
6	Helical Gear	25	Hex Head Cap Screw	54	Lockwasher	81	Trunnion Pin
7	Bushing for End Cap	26	Lockwasher	55	O-Ring	82	Flat Washer
8	Clevis	27	Cotter Pin	56	Socket Head Cap Screw	83	Cotton Pin
9	Jam Nut	28	Flat Washer	57	Internal Tooth Lockwasher	85	Body Tube Adapter
10	Clevis Pin	29	Drive Studs	58	Warning Plate	86	Dowel Pin
11	Nameplate	30	Motor	59	Pipe Plug	89	Socket Head Cap Screw
12	Motor Gasket	31	Bearing Plate	60	Limit Switch Gasket	90	Potentiometer Sub Assembly
13	Ball Bearing	33	Belleville Springs	61	Thrust Switch Gasket	95	Low Head Socket Screw
15	Key (for drive gear)	34	Thrust Limit Sleeve	64	Cotter Pin	100	Motor Pipe Plug
16	Key (for helical gear)	40	Motor Pinion	65	Thrust Switch Compartment Cover	101	Flexlocnut
17	O-ring	41	Drive Gear	66	Thrust Switch Assembly	106	O-Ring
18	Polypak Rod Seal	45	Drive Screw			132	Set Screw
19	Rod Wiper	46	Body Tube				

WARNING

Disconnect all electrical power to the actuator.

Maintenance

Disassembly and Reassembly of Model 7000 Posi-Tork Actuators

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 screw (25) and removing lockwasher (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)

15. Scribe alignment marks on the side of the housing (1) in line with the set screws (132) in the body tube (46).
16. Remove the locknut (22), washer (20) and where applicable the o-ring (106) from the tie rods (48).
17. Remove the set screws (132) from the body tube.
18. While tapping on the outside surface of the end cap (3), pull out the body tube along with the end cap.
19. 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 19: Use Loctite® 242 or equivalent on the threads when reassembling the drive nut to the extension rod.

Step 18: Realign the set screw hole in the body tube with the alignment mark scribed on side of the housing in Step 15.

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.

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.

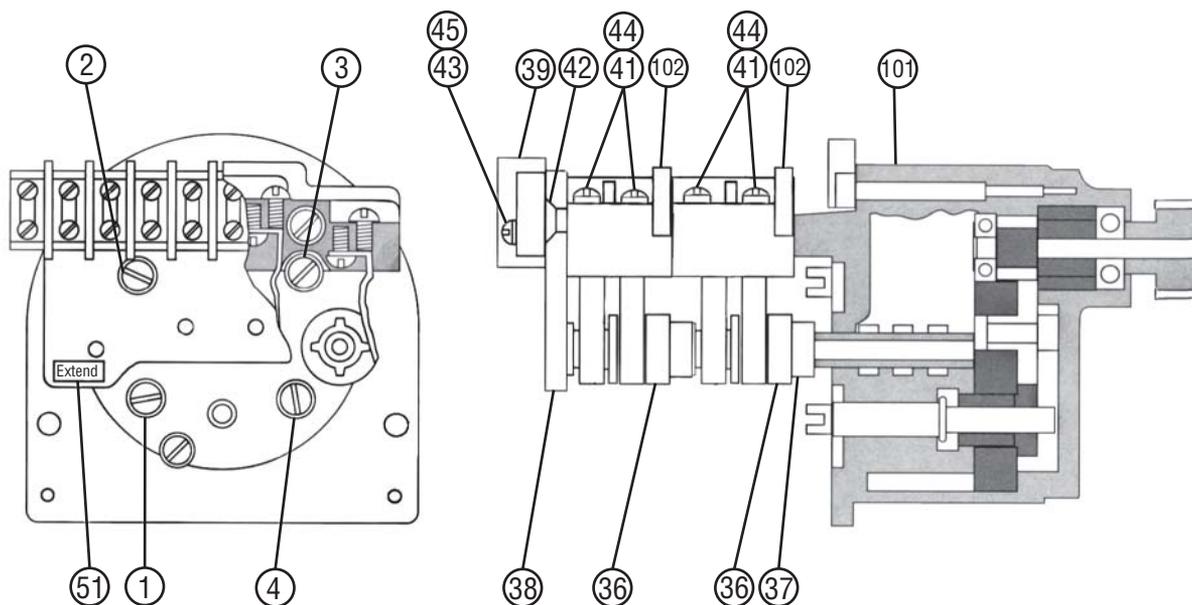


Figure 4 - Geared Position Limit Switch Parts Drawing

Table 2 - 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	Socket 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

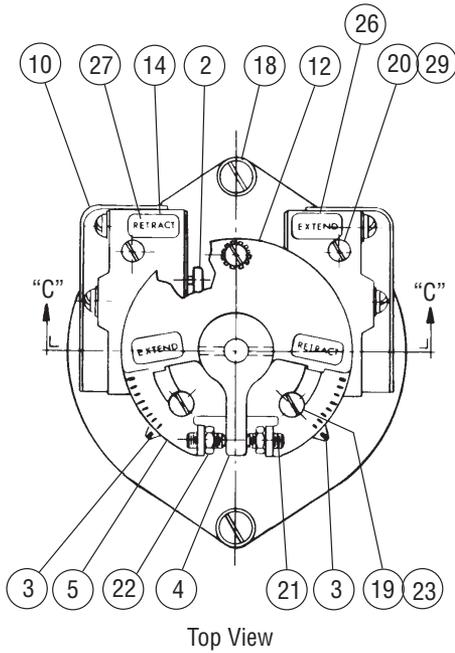
Geared Position Limit Switch Adjustment

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.

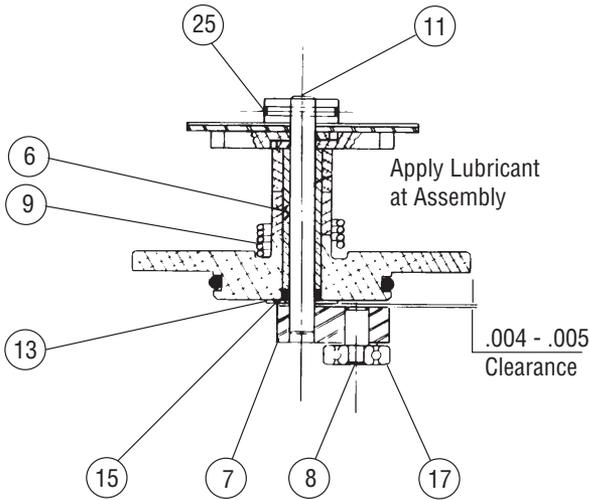
WARNING

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

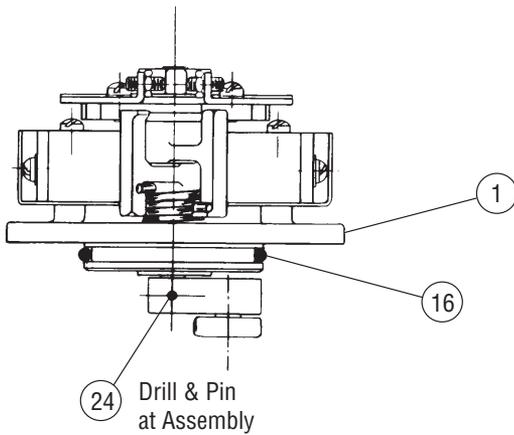
1. Remove the position limit switch compartment cover (51) to gain access to the position switch assembly (52).
2. Remove the motor pipe plug (100) for access to slot "A", located in the end of the motor shaft.
3. With a manual or power screw driver, rotate the shaft clockwise to extend the actuator 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.



Top View



Side View



Drill & Pin at Assembly

Table 3 - Thrust Limit Switch Parts List

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

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.

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.**

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 4 - 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

Table 5 -Acceptable Standard Lubricants

Actuator Area	Name	Base	Temperature Range (°F)	Manufacturer
Housing, Gear Box, Thrust Ass'y	Aeroshell 6	Mineral Oil	-40 to 250	Shell
Geared Limit Switch	Mobilgrease 28	Polyalphaolefin (PAO) Synthetic	-65 to 350	ExxonMobil
Motor Rotor	Sealed & lubricated for life bearings			

Table 5A - Substitute Lubricants

Name	Manufacturer
Litholene HEP1	Arco
Mobilux EP1	Mobil
Gulfcrown EP1	Gulf

Optional Equipment

Dust-Ignition Proof Enclosure

Outdoor Hazardous Locations Class II Division I, Groups E, F & G Indoor

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 reinstated 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.

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 control 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 and acme screw pitches. 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.

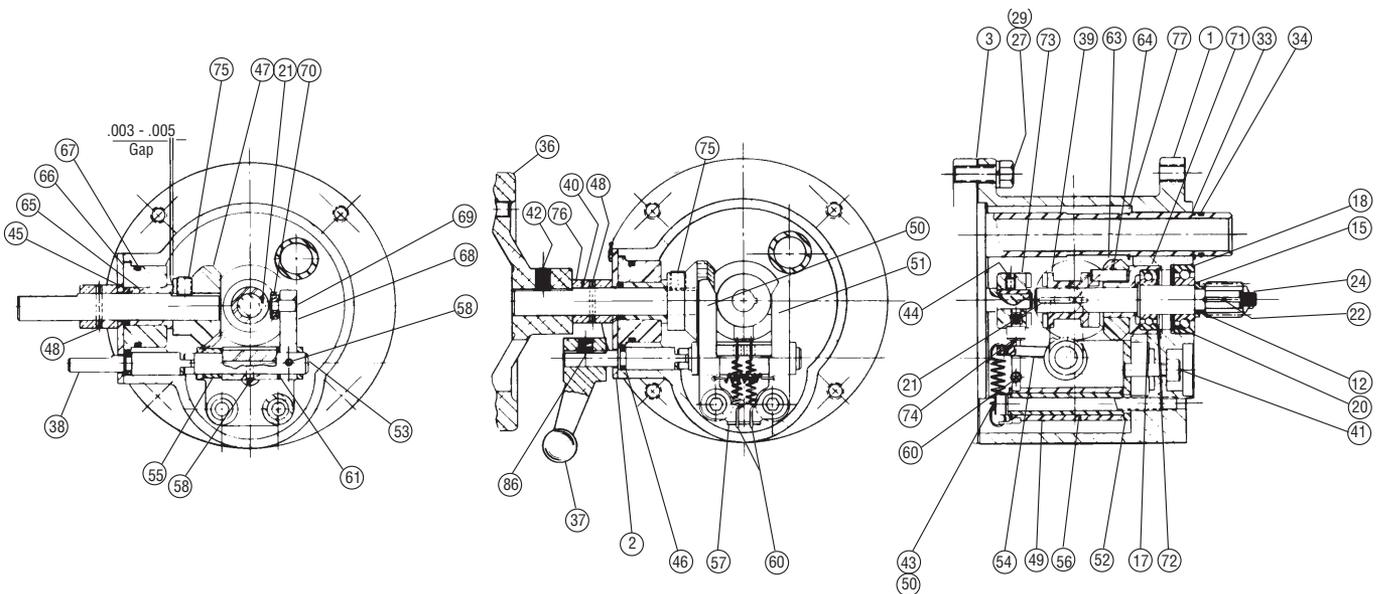


Figure 6 - Manual Handwheel Clutch Assembly Parts Drawing

Table 6 - Manual Handwheel Clutch Assembly Parts List

Item	Description	Item	Description	Item	Description	Item	Description
1	Housing	33	Retaining Ring	49	Tipper Holder	66	Handwheel Shaft Plug
2	Cover Plate	34	O-Ring	50	Tripper #1	67	O-Ring
3	Motor Gasket	36	Handwheel	51	Tripper #2	68	Shifter
12	Drive Shaft	37	Declutch Lever	52	Clutch Bracket	69	Bearing Lever Pin
15	Collar	38	Declutch Shaft	53	Fork Shaft	70	Bearing
17	Bearing	39	Clutch	54	Latch	71	Bearing Cartridge
18	Bearing	40	Handwheel Shaft	55	Fork Spacer	72	Retaining Ring
20	Bearing Spring	41	Socket Head Cap Screw	57	Bridge	73	Motor Clutch
21	Round End Key	42	Set Screw	58	Spring Pin	74	Tripper Pin
22	Key	43	Socket Head Cap Screw	60	Fork Springs	75	Set Screw
24	Pinion Locknut (where applicable)	45	Quad Ring	61	Thrust Washer	76	Bushing
27	Hex Head Cap Screw	46	Quad Ring	63	Clutch Gear	77	Retaining Ring
29	Lockwasher	47	Handwheel Shaft Gear	64	Dowel Pin	80	Lockwasher
		48	Spring Pin	65	Flanged Bearing	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 counterclockwise 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.

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 6, for the procedure listed above.
2. To replace the handwheel clutch assembly, use the procedures listed above in reversed order.

WARNING

Disconnect all electrical power to the actuator.

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 assembly procedure. Upon completion of reassembly, liberally grease all sliding and rotating components before reinstalling the manual handwheel clutch assembly to the actuator.

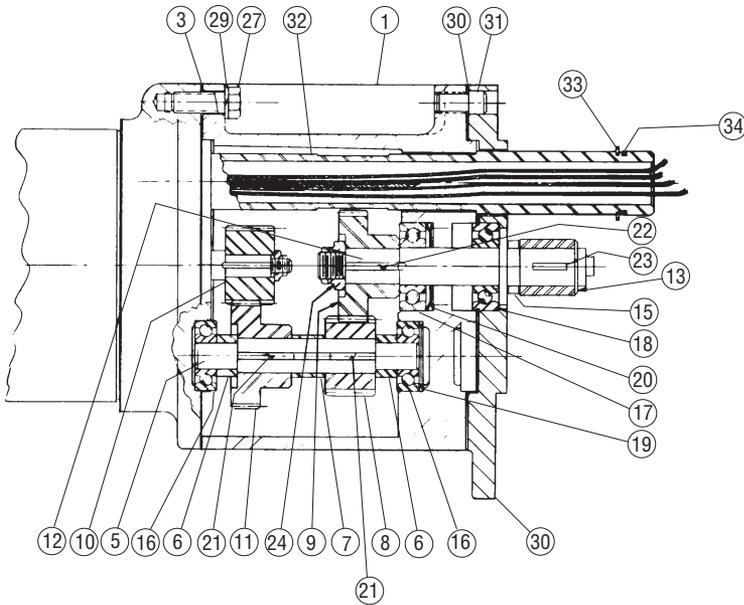


Figure 7 - Gear Box Assembly Parts Drawing

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.

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.

Table 7 - 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)

- 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).

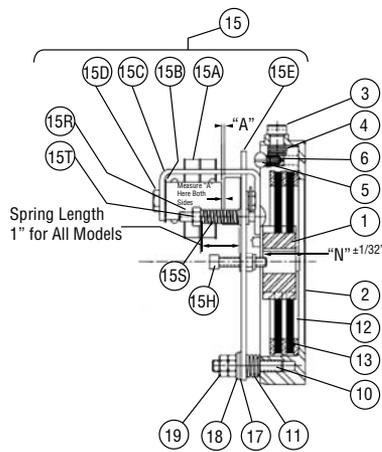


Figure 8 - Electric Brake Parts Drawing

Table 8 - Electric Brake Parts List

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

Brake Wear 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.

- To adjust, remove the brake cover to expose the square head wear adjusting screws (15H) and expose the magnet air gap "A."
- Measure the air gap "A" using a 3/8" to 1/2" wide feeler gauge. (Measure at center of magnet.)
- Turn the two square head adjusting screws (15H) until the air gap "A" measures:
 - .045/.050 for 3# models
 - .050/.055 for 6# models
 - .050/.055 for 10# models
 The air gap should be the same on both sides.

CAUTION

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

Manual Brake Release

WARNING

Disconnect all electrical power to the actuator.

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

- Remove the brake cover and conduit pipe plug from the motor end bell.
- 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.
- Use a screwdriver in the slotted motor shaft to rotate the shaft clockwise to extend the actuator extension rod.
- When the adjustment is completed or power is restored, replace the brake cover and conduit pipe plug securely.

Brake Removal and Replacement

WARNING

Disconnect all electrical power to the actuator.

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

- Remove the brake cover from the motor end bell.
- Disconnect the coil power wires, leading into the actuator motor housing, from the terminal strip.
- 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.

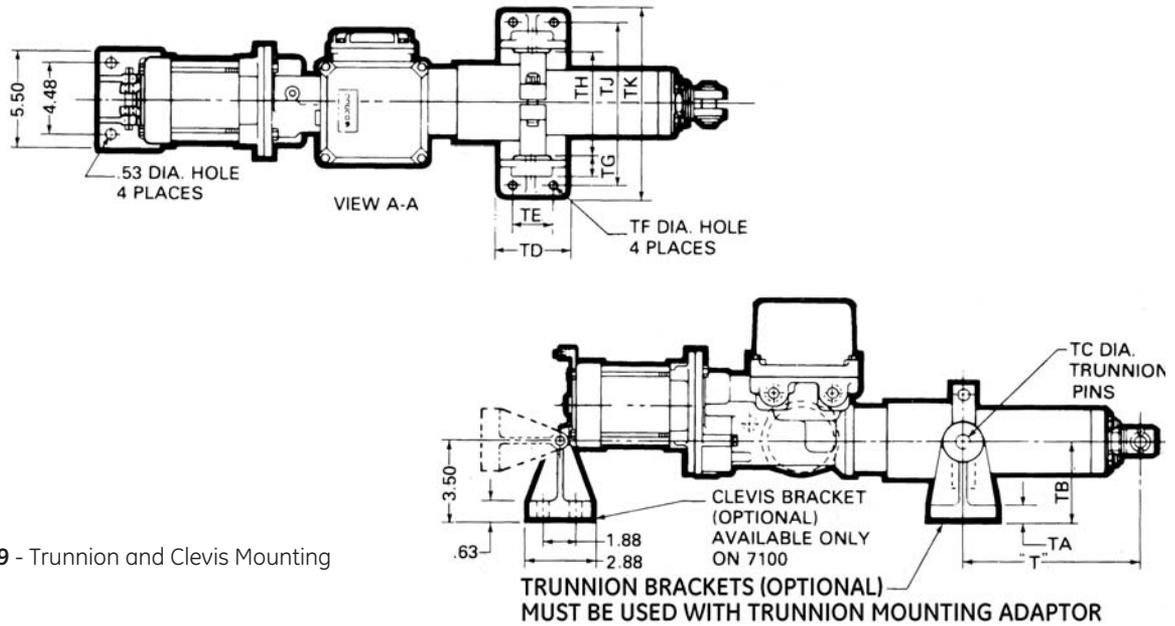


Figure 9 - Trunnion and Clevis Mounting

Table 9A - 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 9B - "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 GE for engineering drawings.

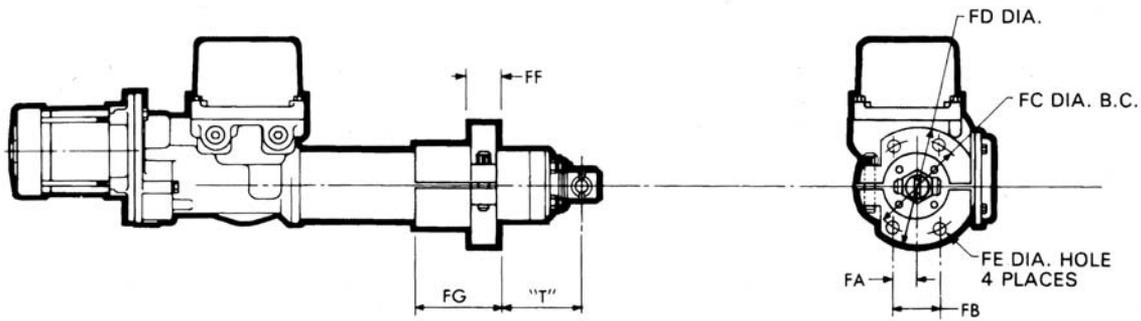


Figure 9 - Face/Flange Mounting

Table 10A - 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 10B - "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 GE for engineering drawings.

NOTES



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