

## HTR Series Actuators

# Maintenance Instructions & Parts List

*Provide Model Number and Serial Number When Ordering Spare Parts.*

### GENERAL

HTR Series Hydraulic Rack & Pinion Actuators are designed for a maximum operating pressure of 3,000 psi non-shock.

The actuator consists of a Pinion and one or two Racks located within a Housing. Pressurization of alternate cylinder port(s) results in shaft rotation.

The gear chamber has been filled with a Moly grease containing a minimum Molybdenum Disulfide (MSO<sub>2</sub>) content of 3%.

In the event that maintenance is required, the following steps should be used as a guide:

### ASSEMBLY AND DISASSEMBLY PROCEDURES

#### A. Inspection & Replacement of End Cap Seals, #9.

1. Place actuator in the mid-stroke position as shown. Remove Tie Rod Nuts, #10, from Tie Rods, #13.
2. Pull End Cap, #11, free from Cylinder Tube, #12.
3. Inspect and/or replace End Cap O-Ring, #9. Lubricate Seal and End Cap before reinstalling.
4. Replace End Cap, #11, on Cylinder Tube, #12, and assemble Tie Rod Nuts, #10 to Tie Rods, #13.
5. Torque Tie Rod Nuts per table.

#### B. Inspection & Replacement of Wear Rings, #4, Piston Seals, #5, and Cylinder O-Ring, #8.

1. Repeat Steps A1 and A2.
- For Models HTR75 through HTR 600:
2. Remove Rack Bolt, #7.
  3. Screw two (2) threaded rods into the tapped holes in Piston, #16, and pull free from Cylinder Tube, #12.

For Models HTR.9 through HTR45:

4. Pull Cylinder Tube, #12, free from Housing, #2.
5. Remove Rack Bolt, #7.

For All Models

6. Inspect Piston, #16, and replace Piston Seal, #5.
7. Inspect and/or replace Wear Rings, #4.
8. Inspect and/or replace Cylinder O-Ring, #8.
9. Replace Cylinder Tube, #12 to Housing, #2.
10. Slide Piston, #16, with Piston Seal and Wear Rings assembled onto it, into Cylinder Tube, #12, until it contacts Rack, #17.

11. Replace Rack Bolt, #7 and torque per table.  
**Caution:** Nylon Slug, #6, is designed to prevent Rack Bolt from vibrating loose during operation; replace as required.

12. Replace End Cap, #11, and Tie Rod Nuts, #10; torque per table.

#### C. Inspection and Replacement of Pinion and Bearing Retainer O-Rings, #1 and #24.

1. Loosen Lock Screw, #19.  
**Caution:** Failure to do so will damage threads.
2. Using spanner wrench, remove Bearing Retainer, #25, by turning counter-clockwise.
3. Remove Bearings, #22, and Pinion, #23.  
**Caution:** Make match marks to re-establish the correct timing.
4. Inspect and/or replace Pinion O-Ring, #1, located at the "front" or blind side of Housing #2.
5. Reinstall Bearings, #22, and Pinion #23.
6. Inspect and/or replace Bearing Retainer O-Ring, #24, located on outside diameter of Bearing Retainer, #25.
7. Inspect and/or replace Pinion O-Ring, #1, located on inside diameter of Bearing Retainer, #25.
8. Apply Moly Grease to Bearing Retainer Threads and reinstall into Housing, #2.
9. Torque Bearing Retainer, #25 per table.
10. Install and tighten Locking Screw, #19, per torque table.

#### D. Complete Disassembly of Actuator.

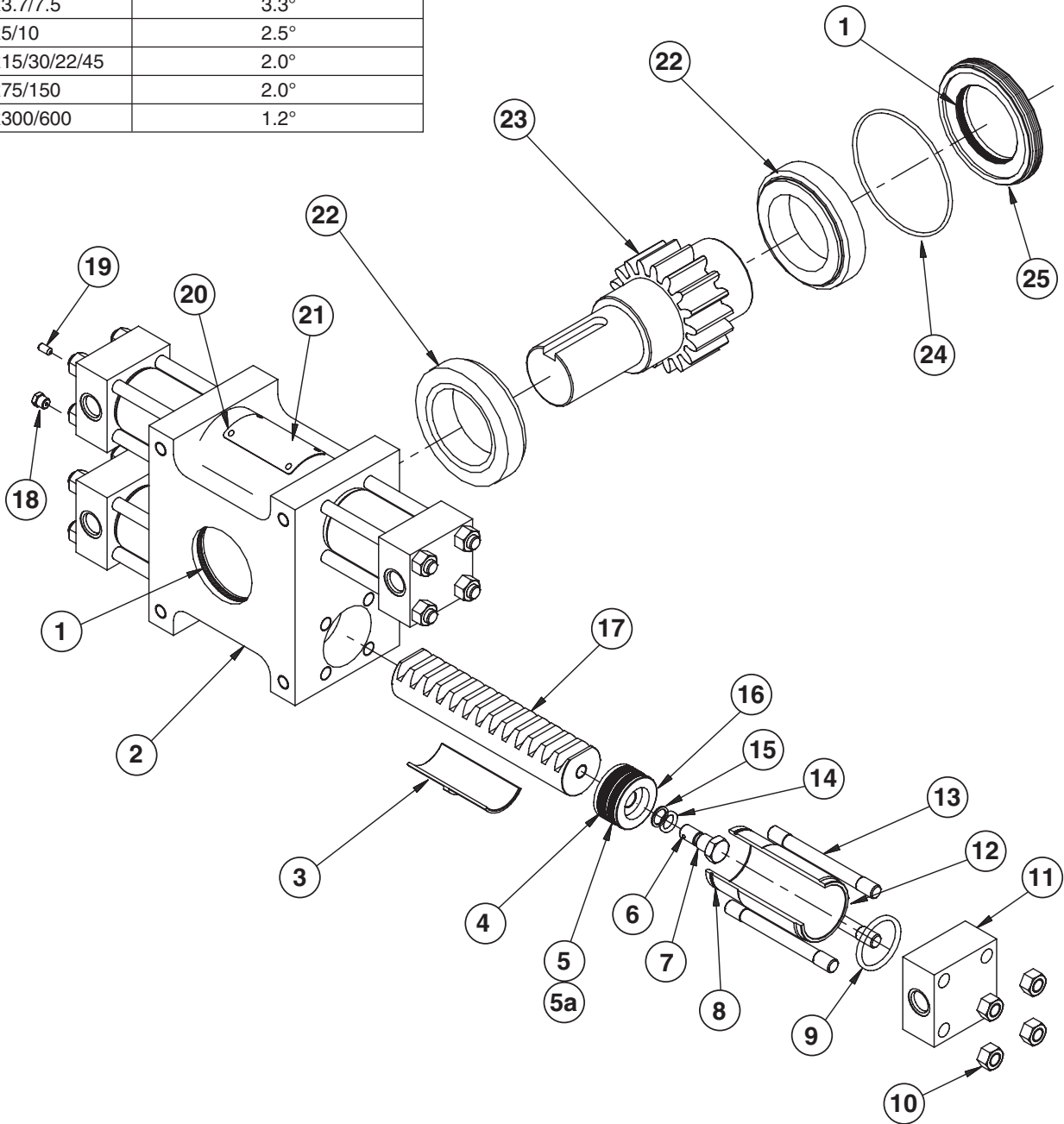
1. Repeat Steps A1 and A2.
2. Repeat Steps B2 through B5.
3. Repeat Steps C1 and C3.
4. **Caution:** Make match marks to re-establish the correct timing.
5. Push Rack from either end to remove from housing.

#### E. Reassembly of Actuator.

1. Follow previous procedures for reassembly of all actuator parts. Refill the gear chamber with Moly Grease with a minimum MSO<sub>2</sub> content of 3%; such as Texaco Molytex EP2.

MODEL	ONE COMPLETE TURN OF ADJ. CAUSES SPECIFIED CHANGING IN ROTATION
HTR.9/1.8	4.0°
HTR3.7/7.5	3.3°
HTR5/10	2.5°
HTR15/30/22/45	2.0°
HTR75/150	2.0°
HTR300/600	1.2°

MAXIMUM UNIT ROTATION IS EQUAL TO ROTATION SPECIFIED IN THE MODEL CODE.  
 ADJUSTERS ALLOW ROTATIONAL POSITIONING EQUAL TO OR LESS THAN MAXIMUM ROTATION.



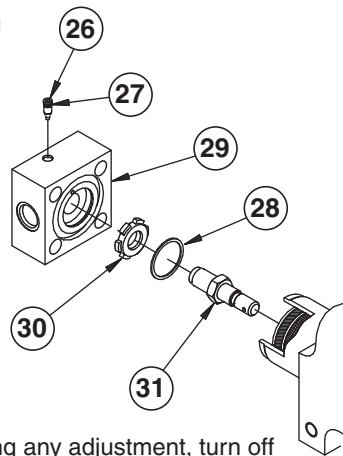
MODEL	TIE ROD NUT #10	RACK BOLT #7 CUSHION PLUG #31	BEARING	LOCKING SCREW #19
HTR.9/1.8	6	3	15	2
HTR3.7/7.5	15	15	30	4
HTR5/10	15	15	50	4
HTR15/30	30	40	100	4
HTR22/45	45	40	100	4
HTR75/150	130	130	250	15
HTR300/600	525	360	500	15

ITEM NO.	DESCRIPTION	QUANTITY	
		SINGLE RACK	DOUBLE RACK
1*	O-RING, PINION	2	2
2	HOUSING	1	1
3	RACK BEARING	1	2
4*	WEAR RING	2	4
5*	PISTON SEAL	2	4
5a*	BACK-UP RING	2	4
6	NYLOK SLUG	2	4
7	RACK BOLT	2	4
8*	O-RING CYLINDER	2	4
9*	O-RING, END CAP	2	4
10	TIE ROD NUT	8	16
11	END CAP	2	4
12	CYLINDER TUBE	2	4
13	TIE ROD	8	16
14*	O-RING, RACK BOLT	2	4
15*	BACK-UP RING, RACK BOLT	2	4
16	PISTON	2	4
17	RACK	1	2
18	RELIEF VALVE	1	1
19	LOCKING SCREW	1	1
20	DRIVE SCREW	4	4
21	NAME PLATE	1	1
22	BEARING	2	2
23	PINION	1	1
24*	O-RING, BEARING RETAINER	1	1
25	BEARING RETAINER	1	1

**NOTE:**

- Items marked with an asterisk (\*) included in a seal repair kit.
- 5a (BACK-UP RING) used only with Viton Seals.

**Cushion Option**



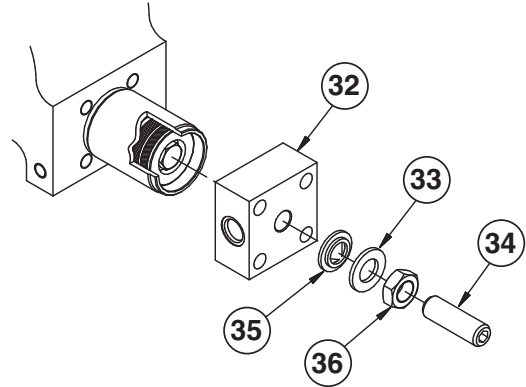
**Caution:** Before making any adjustment, turn off the hydraulic pressure. Never adjust Cushion Screw out past flush with End Cap or counterbore. DO NOT OVERTIGHTEN.

Adjustable cushions are designed to cushion the last 20° of actuator stroke.

**To Adjust:**

Using an Allen wrench, turn Adjustment Screw, #13, counter clockwise for less cushioning.

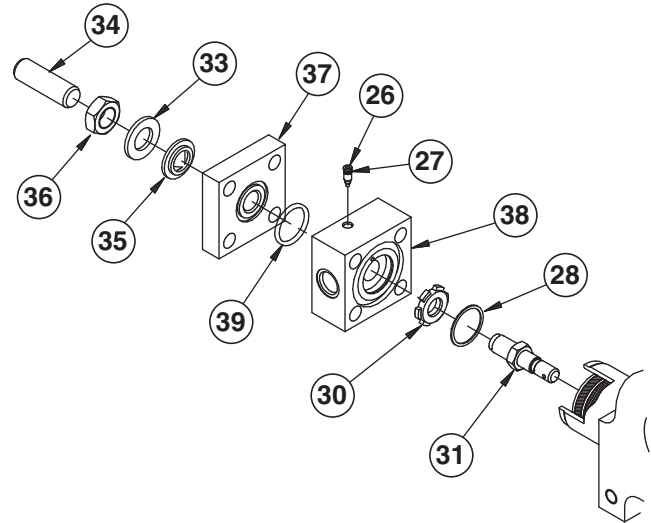
**Stroke Adjust Option**



**Caution:** Before making any adjustment, turn off the hydraulic pressure. To Adjust:

1. Loosen Jam Nut, #31.
2. Turn Stroke Adjusters, #30, CW to reduce stroke, CCW to increase stroke.
3. Tighten Jam Nut, #31.
4. Resume system pressure.

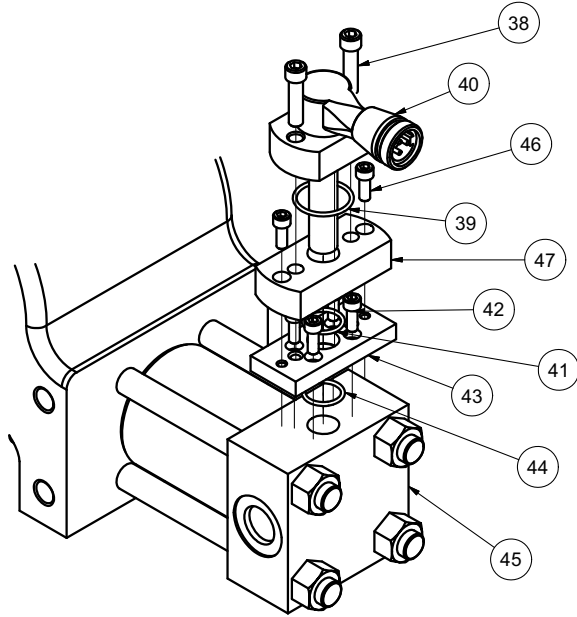
**Cushion and Stroke Adjust Option**



ITEM NO.	DESCRIPTION	QUANTITY
26	CUSHION ADJUSTMENT SCREW	1
27	O-RING, ADJUSTMENT SCREW	1
28	RETAINING RING	1
29	END CAP	1
30	CUSHION BUSHING	1
31	CUSHION PLUG	1
32	END CAP	1
33	WASHER	1
34	STROKE ADJUSTER	1
35	THREAD SEAL	1
36	JAM NUT	1
37	STROKE ADJUST BLOCK	1
38	END CAP	1
39	O-RING, STROKE ADJUST BLOCK	1

**NOTE:** Quantities required are per end cap option specified.

**Proximity Switches**



Parts List		
ITEM NO.	DESCRIPTION	QTY
38	BOLT, PROXIMITY SWITCH	2
39	O-RING, PROXIMITY SWITCH	1
40	PROXIMITY SWITCH	1
41	O-RING, SPACER BLOCK	1
42	BOLT, ADAPTOR BLOCK	4
43	ADAPTOR BLOCK	1
44	O-RING, ADAPTOR BLOCK	1
45	END CAP	1
46	BOLT, SPACER BLOCK	2
47	SPACER BLOCK	1

Quantities required are per end cap.

**NOTES:**

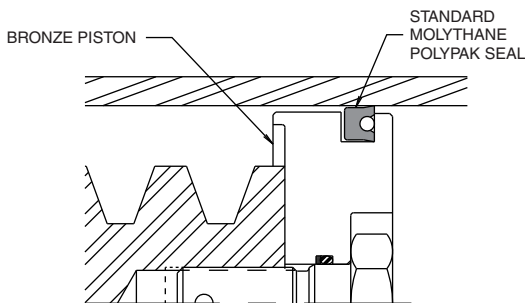
1. Available with or without cushions.
2. Not available with stroke adjusters.
3. Pressure rating: 3000 psi
4. Operating temperature: -4°F to 158°F
5. Specify end cap position (1, 2, 3, 4), switch type, and voltage when ordering.
6. Switch Types:  
 EPS-7 . . . . .Voltage 20 to 250 VAC/ DC  
 EPS-6 . . . . .Voltage 10 to 30 VDC

**Seal Kit Ordering Information**

- Standard units are equipped with nitrile seals.
- Optional seal compounds are available.
- See parts list for items contained in seal kits.
- Seal kit part numbers as follows:

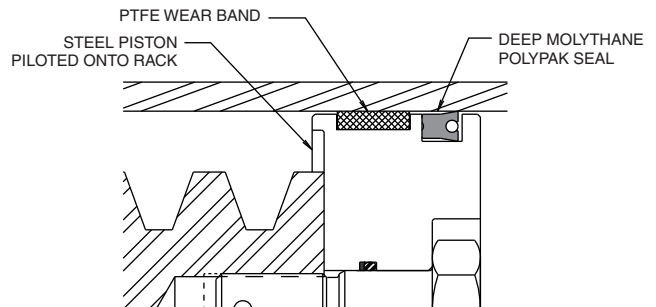
<b>PSK</b>	—	<b>HTR.9</b>	<b>V</b>
Parker Seal Kit		Base Model	Omit = Standard V = Fluorocarbon W = Carboxilated Nitrile Piston Seals

**NOTE:** The seal kit is equipped with parts necessary to re-seal Design Series "A", "B" or "C" HTR Series rotary actuators.



**Design Series "A" or "B"**

HTR Series rotary actuators with a Design Series suffix of "A" or "B" at the end of the model number should be re-assembled with the piston/pistonsealing configuration illustrated above. These models are equipped with a bronze piston and one "standard" Molythane Polypak piston seal.



**Design Series "C"**

HTR Series rotary actuators with a Design Series suffix of "C" at the end of the model number have the piston/piston sealing configuration illustrated above. Each piston is equipped with one non-metallic wear band and one "deep" Molythane Polypak piston seal for superior wear resistance.