PM-PTR/LTR-C
Automation Actuator Division
Wadsworth, Ohio 44281
October 27, 1993
Rev. October 1999

## PTR/LTR Series Actuators

# Maintenance Instructions & Parts List

Provide Model Number and Serial Number When Ordering Spare Parts.

The PTR/LTR Series Actuators will provide superior performance in heavy duty pneumatic and medium duty hydraulic applications. The new PTR Series "Wear-Tek" and LTR Series "Wear-Pak" piston sealing configurations and anti-friction ball bearings are used to guarantee low breakaway pressure and eliminate erratic motion at low speeds.

In the event that maintenance is required, the following steps should be used as a guide. It is recommended that a suitable oil or O-ring lubrication compatible with the operating media, such as Parker Lube-A-Cyl, be used on all seals and mating parts to facilitate assembly.

A. Inspection & Replacement of Piston Seal, #10, Wear Rings, #15, and O-Ring End Cap, #12.

1. Remove Tie Rod Nuts, #17 from Tie Rods,#8.
2. Pull End Cap, #16 free from Cylinder Tube, #14.
3. Pull Cylinder Tube, #14 free from Housing, #13.
4. Push Piston, #11 free from Cylinder Tube, #14.
5. Inspect and/or replace Piston Seal, #10, Wear Rings, #15, and O-Ring End Cap, #12.
6. Inspect and/or replace O-Ring Cylinder, #7 (for LTR Models only).
7. Reassemble as shown in figure and torque Tie Rod Nuts, #17 per Torque Table.

B. Inspection & Replacement of Bearing, #2.

1. Remove Retaining Ring, #1.
2. Press Pinion, #3, and Bearing #2 from housing, #13.
3. Press Bearing, #2 free from Pinion, #3.
4. Inspect or replace Bearing, #2.
5. Press new Bearing, #2 into Housing, #13.
6. Replace Pinion, #3 into Housing, #13.
7. Press remaining new Bearing, #2 onto Pinion, #3.
8. Replace Retaining Ring, #1.

**NOTE:**

Prior to assembly of an LTR Series actuator, the rack and pinion are coated with a molycoat GN paste and a moly grease containing a minimum $MSO_2$ content of 3%, such as Texaco Molytex EP2.

The PTR Series actuator's rack, pinion and seals are coated with Parker Lube-A-Cyl prior to assembly. Add lubrication as required.

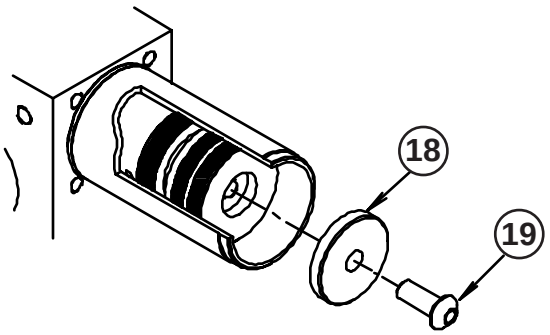
| ITEM NO. | DESCRIPTION | QUANTITY | |
|---|---|---|---|
| | | SINGLE RACK | DOUBLE RACK |
| 1 | RETAINING RING | 2 | 2 |
| 2 | BEARING | 2 | 2 |
| 3 | PINION | 1 | 1 |
| 4 | NAME PLATE | 1 | 1 |
| 5 | DRIVE SCREWS | 4 | 4 |
| 6 | PLUG | 1 | 1 |
| 7* | O-RING, CYLINDER TUBE[1] | 2 | 4 |
| 8 | TIE ROD | 8 | 16 |
| 9 | RACK | 1 | 2 |
| 10* | PISTON SEAL | 2 | 4 |
| 11 | PISTON | 2 | 4 |
| 12* | O-RING, END CAP | 2 | 4 |
| 13 | HOUSING | 1 | 1 |
| 14 | CYLINDER TUBE | 2 | 4 |
| 15* | WEAR RING | 4 | 8 |
| 16 | END CAP | 2 | 4 |
| 17 | TIE ROD NUT | 8 | 16 |
| 18 | BUMPER | 1x | 1x |
| 19 | BUMPER BOLT | 1x | 1x |

All items marked with an asterick (*) are included in a complete seal kit.

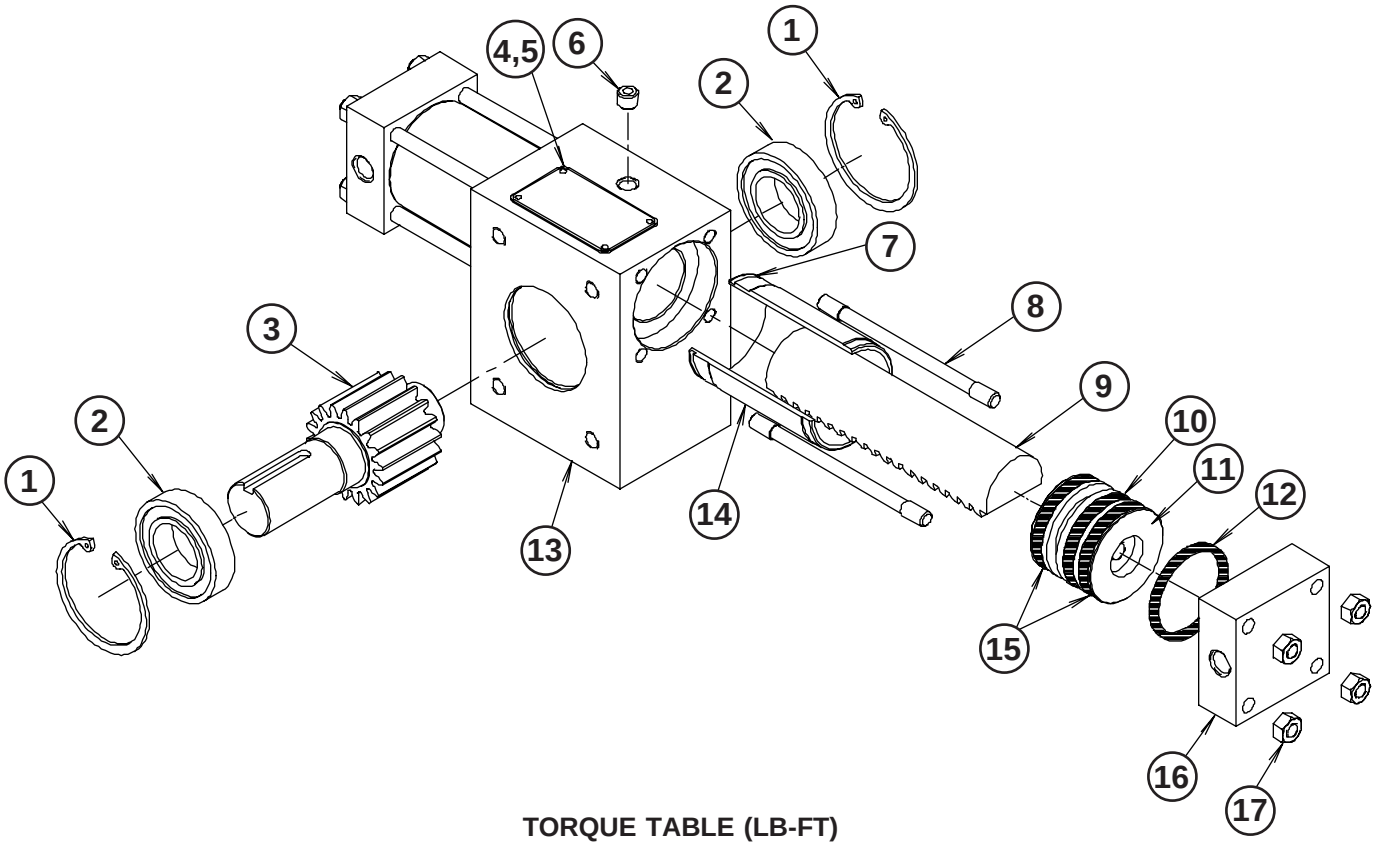
[1] = Only used on units with steel cylinder tubes. (LTR units)

x = Quantity as required per end cap option specified.

## BUMPER OPTION



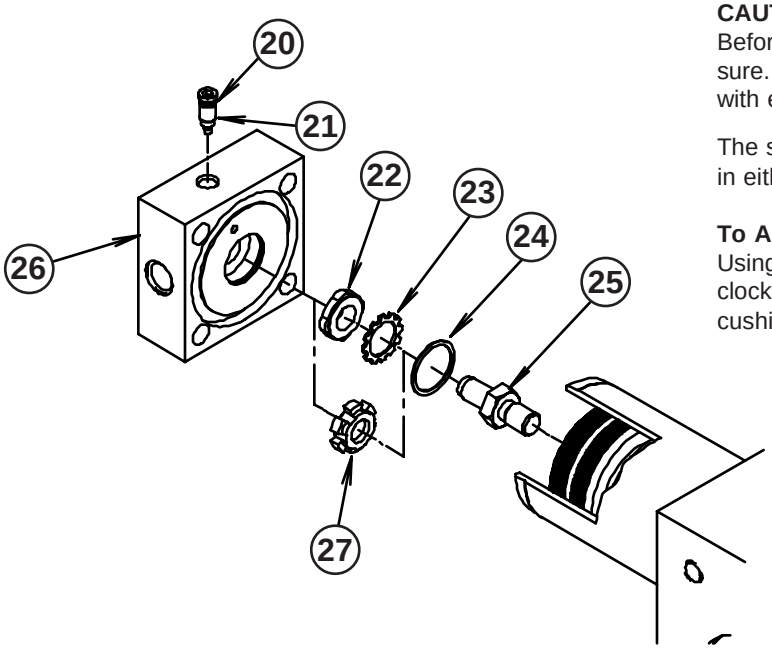

Built in polyurethane bumper pads absorb shock and noise, thus permitting faster cycle times and increased production rates. Recommended torque value for Bumper Bolt, item #19, is shown in Torque Table.




### TORQUE TABLE (LB-FT)

| PTR/LTR MODEL | TIE ROD NUT #17 | | BUMPER BOLT #19 | PISTON BOLT #36 CUSHION PLUG #25 | SHAFT SEAL SCREW #50 | FLANGE BOLT #46 |
|---|---|---|---|---|---|---|
| | CYLINDER TUBE MATERIAL | | | | | |
| | ALUMINUM | STEEL | | | | |
| 101/102 | 1.5 | - | 3 | 3 | 3 | 5 |
| 151/152 | 3 | 5 | 6 | 6 | 3 | 10 |
| 201/202 | 6 | 11 | 20 | 20 | 3 | 17 |
| 251/252 | 6 | 11 | 20 | 20 | 3 | 40 |
| 321/322 | 15 | 20 | 50 | 50 | 3 | 130 |

## CUSHION OPTION




**CAUTION:**
Before making any adjustment, turn off the system pressure. Never adjust cushion adjustment screw out past flush with end cap or counterbore. DO NOT OVERTIGHTEN.

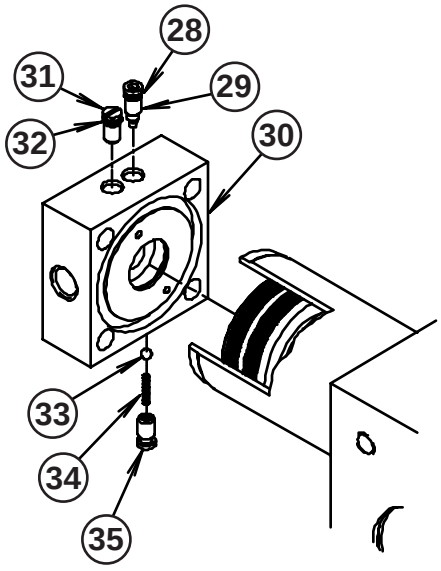
The standard cushions operate over the last 30° of rotation in either or both directions.

**To Adjust:**
Using an Allen wrench, turn Adjustment Screw, #21, clockwise or more cushioning, counterclockwise for less cushioning.

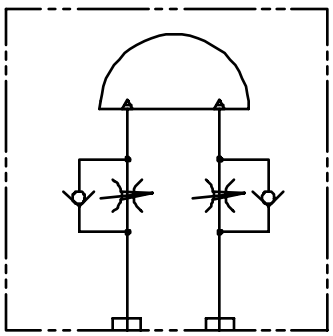
| ITEM NO. | DESCRIPTION | QTY. |
|---|---|---|
| 20 | O-RING, ADJUSTMENT SCREW | 1 |
| 21 | CUSHION ADJUSTMENT SCREW | 1 |
| 22 | CUSHION SEAL | 1 |
| 23 | CUSHION SEAL WASHER[1] | 1 |
| 24 | RETAINING RING[1] | 1 |
| 25 | CUSHION PLUG | 1 |
| 26 | END CAP | 1 |
| 27 | CUSHION BUSHING[2] | 1 |
| 28 | O-RING, ADJUSTMENT SCREW | 1 |
| 29 | FLOW CONTROL ADJ. SCREW | 1 |
| 30 | END CAP | 1 |
| 31 | PLUG | 1 |
| 32 | O-RING, PLUG | 1 |
| 33 | CHECK BALL | 1 |
| 34 | CHECK SPRING | 1 |
| 35 | CHECK PLUG | 1 |

**NOTE:** Quantities shown are as required per end cap option specified.
[1] = Cushion seal configuration for use with pneumatic service.
[2] = Cushion bushing for use with hydraulic service.

## PORT FLOW CONTROL OPTION




Schematic



Built in meter-out flow controls provide for precise regulation of actuator speed and eliminate the cost and space of externally mounted components. A separate spring loaded ball check is used to provide free flow in the opposite direction.

When both cushions and port flow controls are specified they will be stamped "C" and "P" respectively.

**To Adjust:**
Using an Allen wrench, turn Adjustment Screw, #29, clockwise for slower speed; counterclockwise for more speed.

# STROKE ADJUST OPTIONS

Stroke adjusters will reduce the angle of rotation by 10° or 30° in either or both directions. Typical applications are for initial set up purposes where exact rotation requirements may change between various operations.

**CAUTION:** Before making any adjustments, turn off system pressure and ensure that no residual pressure exists in the actuator.

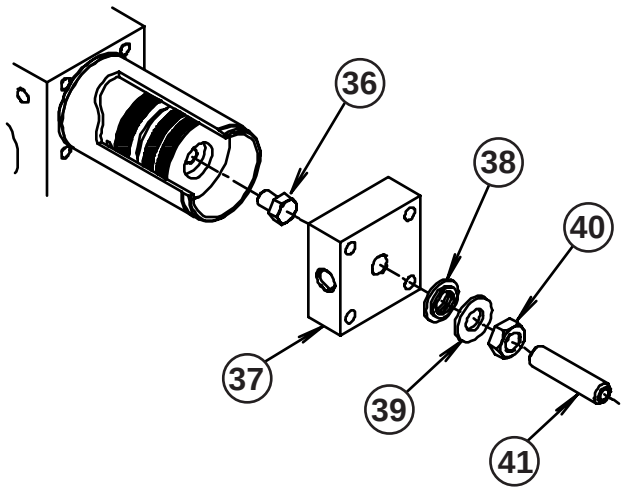
| PTR/LTR MODEL | ONE COMPLETE TURN OF ADJUSTER CAUSES SPECIFIED CHANGE IN ROTATION |
|---|---|
| 101/102 | 4.0° |
| 151/152 | 4.6° |
| 201/202 | 3.2° |
| 251/252 | 3.2° |
| 312/322 | 2.4° |

Standard cushions operate over the last 30° of rotation. Stroke adjusters will decrease the cushion length by the same amount. For example, reducing the rotation by 5° yields 25° cushion length.

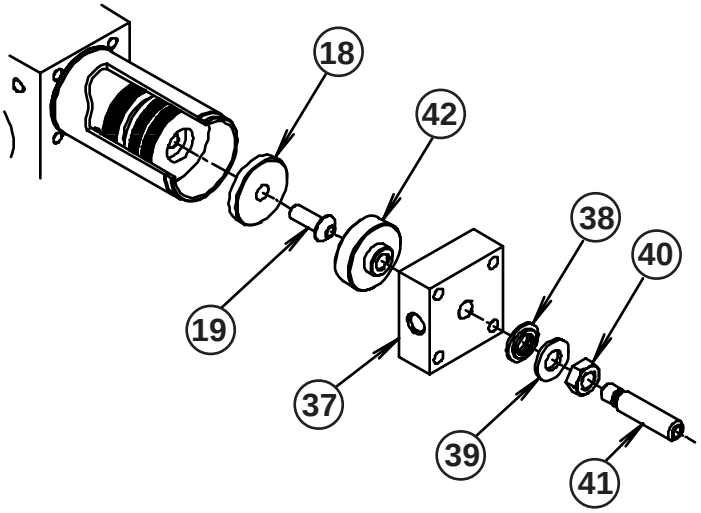
**To Adjust:**

1. Loosen Jam Nut, #40.
2. Turn Stroke Adjuster, #41 clockwise to reduce stroke, counterclockwise to increase stroke.
3. Tighten Jam Nut, #40.
4. Resume system pressure.

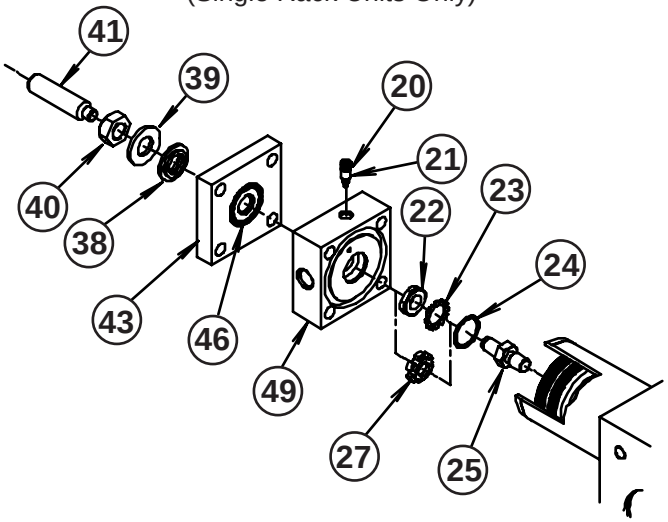
**30° STROKE ADJUST OPTION**




**30° STROKE ADJUST OPTION WITH BUMPER**




**10° STROKE ADJUSTMENT WITH CUSHION OPTION**
(Single Rack Units Only)




| ITEM NO. | DESCRIPTION | QTY. |
|---|---|---|
| 36 | PISTON BOLT | 1 |
| 37 | END CAP | 1 |
| 38 | THREAD SEAL | 1 |
| 39 | LOCK WASHER | 1 |
| 40 | JAM NUT | 1 |
| 41 | STROKE ADJUSTER | 1 |
| 42 | STROKE ADJUST HEAD | 1 |
| 43 | STROKE ADJUST BLOCK | 1 |
| 44 | O-RING, STROKE ADJUST BLOCK | 1 |
| 45 | END CAP | 1 |

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

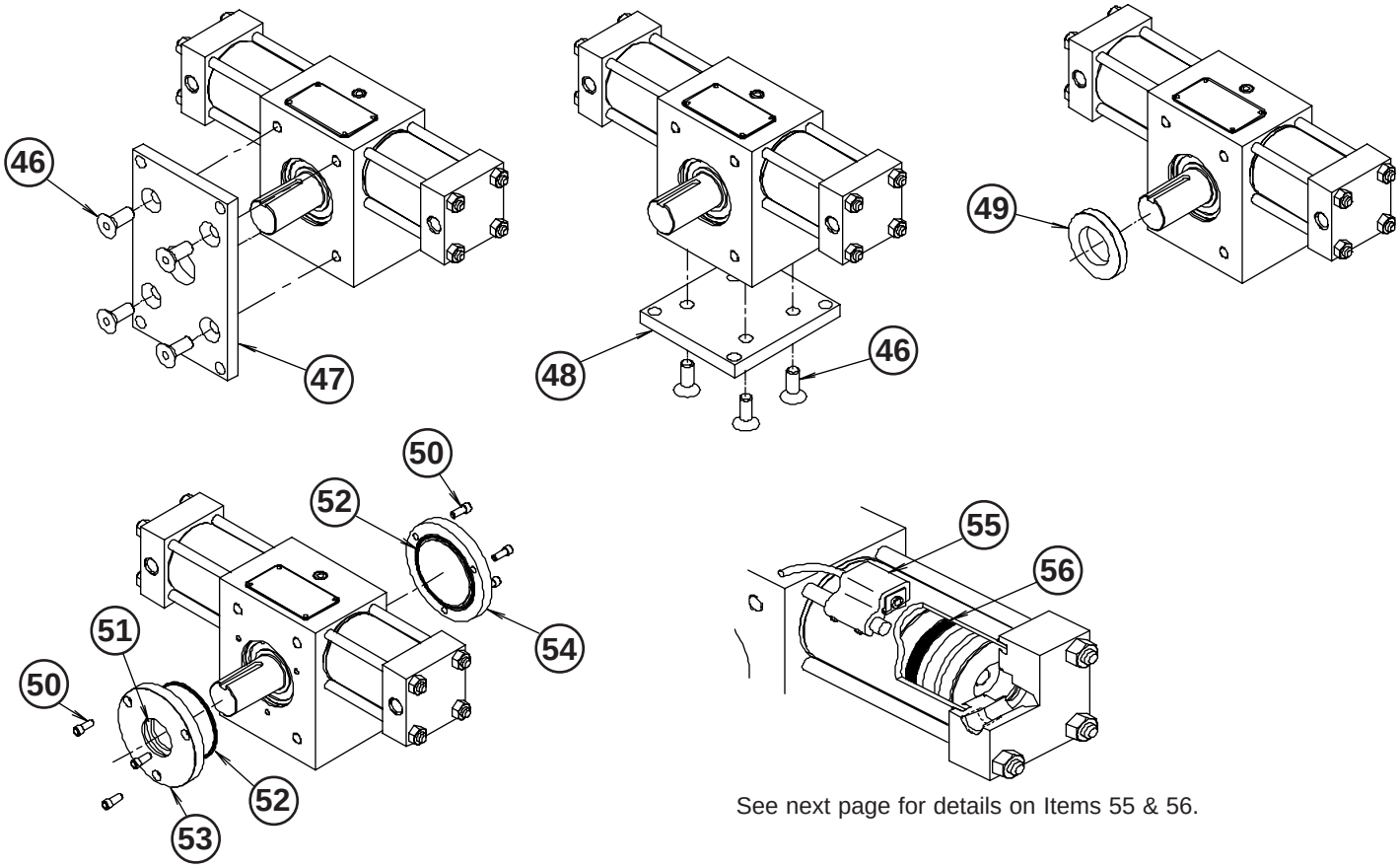
# MOUNTING OPTIONS

Mounting options utilize existing face and base mounting holes.

Shaft seal covers are designed to prolong bearing life by isolating them from external contamination and pressure.

**NOTE:** [1] = Quantity is 2 if double-end shaft extension is specified.
[2] = Quantity is 0 if double-end shaft extension is specified.

| ITEM NO. | DESCRIPTION | QTY. |
|---|---|---|
| 46 | FLANGE BOLT | 4 |
| 47 | FRONT FLANGE | 1 |
| 48 | FOOT FLANGE | 1 |
| 49 | PILOT RING | 1 |
| 50 | SHAFT SEAL COVER SCREW | 6 |
| 51 | SHAFT SEAL | 1[1] |
| 52 | O-RING | 2 |
| 53 | SHAFT SEAL COVER WITH HOLE | 1[1] |
| 54 | SHAFT SEAL COVER, SOLID | 1[2] |




See next page for details on Items 55 & 56.

# REED SWITCH OPTION

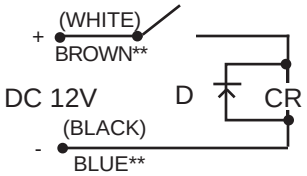
### SPECIFICATIONS

| | |
|---|---|
| Switching Logic: | Normally Open |
| Voltage Rating: | 85-125 VAC or 5-30 VDC* |
| Power Rating: | 10 Watts AC or DC/Resistive Load<br>5 Watts AC or DC/Inductive Load |
| Switching Current Range: | 10-200 mA/Resistive Load (PC, Sequencer)<br>10-100 mA/Inductive Load (Relay) |
| Switching Response: | 300 Hz Maximum |
| Breakdown Voltage: | 1.8kVACrms for 1 sec., lead to case |
| Min. Current for LED: | 18mA |
| Operating Temperature: | 14° to 140° F(-10° to 60° C) |
| Lead Wire Length: | 39 inches (1 meter) |

* Polarity is restricted for DC operation
(+) to BROWN
(-) to BLUE
If these connections are reversed the contacts will close, but the LED will not light.
Prior to October, 1993:
(+) WHITE
(-) BLACK

### INTEGRAL CIRCUIT FOR SWITCHING CONTACT PROTECTION

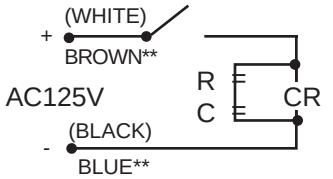
(Required for proper operation 24V DC)
Put Diode parallel to loads following polarity as shown below.



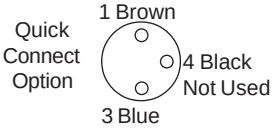

D: Diode: select a Diode with the breakdown voltage and current rating according to the load.
CR: Relay coil (under 0.5W coil rating)

** Applies to Switches Manufactured After 10/15/93.

(Recommended for longer switch life 125V AC)
Put resistor and capacitor parallel to loads.



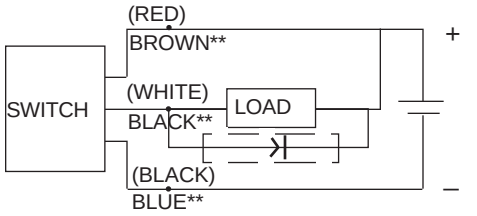

CR: Relay coil (under 2W coil ratings)
R: Resistor under 1 K ohm
C: Capacitor 0.1 µF



# HALL EFFECT SWITCH OPTION

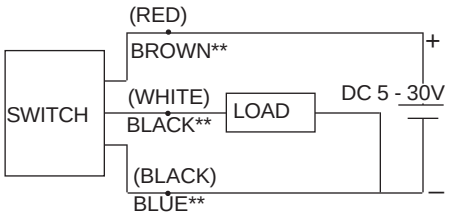
**SPECIFICATIONS**

| | |
|---|---|
| Type: | Solid State Type (PNP or NPN) |
| Switching Logic: | Normally Open |
| Supply Voltage Range: | 5 - 30VDC |
| Current Output Range: | Up to100 mA at 5 VDC,<br>Up to 200 mA at 12 VDC and 24 VDC |
| Current Consumption: | 7 mA at 5 VDC, 15 mA at 12 VDC,<br>and 30 mA at 24 VDC |
| Switching Response: | 1000 Hz Maximum |
| Residual Voltage: | 1.5V Maximum |
| Leakage Current: | 10uA Maximum |
| Breakdown Voltage: | 1.8kVACrms for 1 sec., lead to case |
| Min. Current for LED: | 1mA |
| Operating Temperature: | 14° to 140° F (-10° to 60° C) |
| Lead Wire Length: | 39 inches (1meter) |

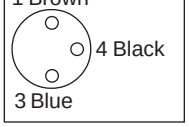



* When connecting Inductive Load (relay, electromagnetic valve etc.) it is recommended to insert protection circuit. Diode 100V 1A. (NPN connection shown)

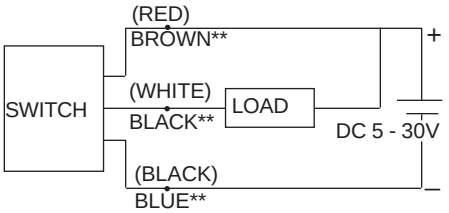
## PNP WIRING CONNECTION




**Quick Connect Option**




## NPN WIRING CONNECTION




** Applies to Switches Manufactured After 10/15/93.

# PROXIMITY SWITCHES

The inductive type proximity switch provides end of rotation indication. The non-contact probe senses the presence of the ferrous cushion spear and has no springs, plungers, cams or dynamic seals that can wear out or go out of adjustment. The switch is solid state and meets NEMA 1, 12 & 13 specifications. For ease of wiring the connector housing is rotatable through 360°. To rotate, lift the cover latch, position, and release.*

The standard proximity switch controls 20-230 VAC/DC loads from 5 to 500 mA. The low 1.7 mA off-state leakage current can allow use for direct PLC input. The standard short circuit protection (SCP) protects the switch from a short in the load or line upon sensing such a condition (5 amp or greater current) by assuming a non-conductive mode. The fault condition must be corrected and the power removed to reset the switch preventing automatic restarts.

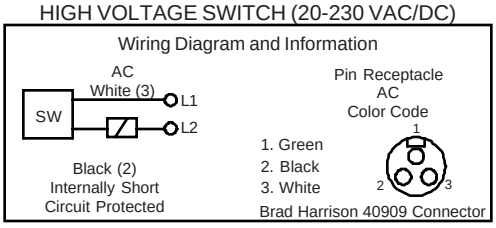
The low voltage DC switch is also available for use with 10-30 VDC. This switch is in a non-rotatable housing, but does incorporate the short circuit protection.

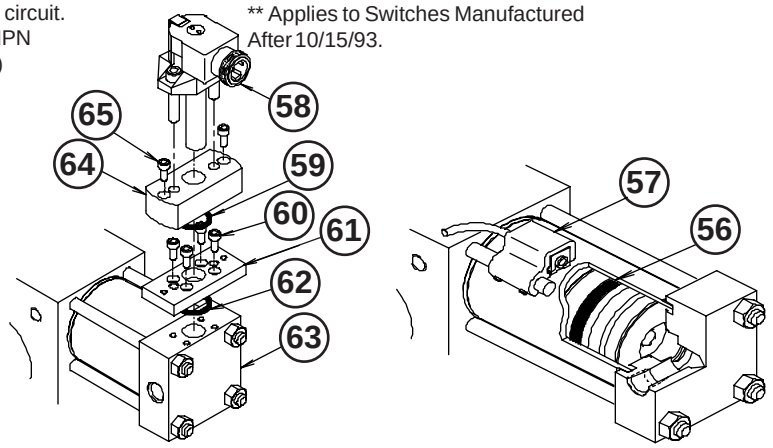
Both switches are equipped with two LEDs, "Ready" and "Target". The "Ready" LED is lit when power is applied and the cushion spear is not present. The "Target" LED will light and the "Ready" LED will go out when the switch is closed, indicating the presence of the cushion spear. Both LEDs flashing indicates a short circuit condition.

**NOTES:**

1. Available with or without cushions.
2. Not available with stroke adjusters.
3. Pressure rating: 1500 psi
4. Operating temperature: -4°F to 158°F
5. Specify switch type, orientation and voltage when ordering.
6. Not available on PTR/LTR 10 size units.
7. The low voltage DC switch is available in non-rotatable style only; consult representative for further information.

HIGH VOLTAGE SWITCH (20-230 VAC/DC)

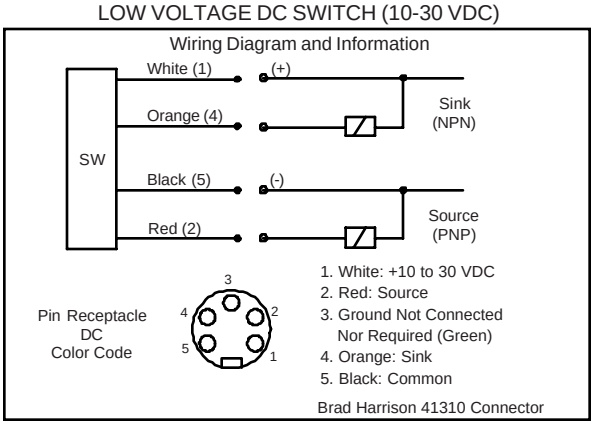


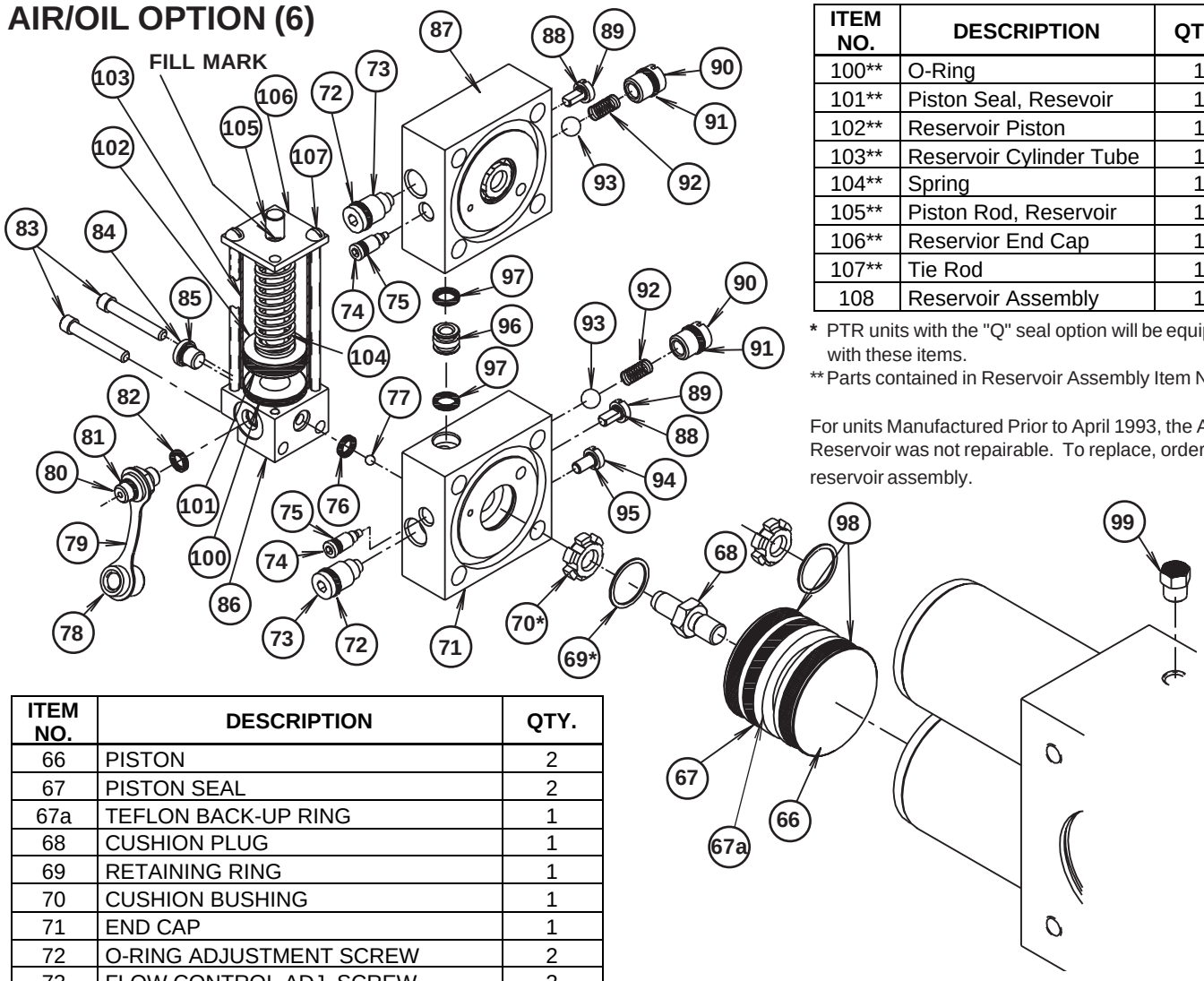

| ITEM NO. | DESCRIPTION | QTY. |
|---|---|---|
| 55 | REED SWITCH KIT<br>(Lead Type or Quick Connect) | 1 |
| 56 | MAGNET | 2 |
| 57 | HALL EFFECT SWITCH KIT<br>(Lead Type or Quick Connect) | 1 |
| 58 | PROXIMITY SWITCH | 1 |
| 59 | O-RING, ADAPTOR BLOCK | 1 |
| 60 | SCREW, SPACER BLOCK | 4 |
| 61 | SPACER BLOCK | 1 |
| 62 | O-RING, SPACER BLOCK | 1 |
| 63 | END CAP | 1 |
| 64 | ADAPTOR BLOCK | 1 |
| 65 | SCREW, ADAPTOR BLOCK | 2 |

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

LOW VOLTAGE DC SWITCH (10-30 VDC)



# AIR/OIL OPTION (6)




| ITEM NO. | DESCRIPTION | QTY. |
|---|---|---|
| 100** | O-Ring | 1 |
| 101** | Piston Seal, Resevoir | 1 |
| 102** | Reservoir Piston | 1 |
| 103** | Reservoir Cylinder Tube | 1 |
| 104** | Spring | 1 |
| 105** | Piston Rod, Reservoir | 1 |
| 106** | Reservior End Cap | 1 |
| 107** | Tie Rod | 1 |
| 108 | Reservoir Assembly | 1 |

***** PTR units with the "Q" seal option will be equipped with these items.

****** Parts contained in Reservoir Assembly Item No. 108

For units Manufactured Prior to April 1993, the Air-Oil Reservoir was not repairable. To replace, order the reservoir assembly.

| ITEM NO. | DESCRIPTION | QTY. |
|---|---|---|
| 66 | PISTON | 2 |
| 67 | PISTON SEAL | 2 |
| 67a | TEFLON BACK-UP RING | 1 |
| 68 | CUSHION PLUG | 1 |
| 69 | RETAINING RING | 1 |
| 70 | CUSHION BUSHING | 1 |
| 71 | END CAP | 1 |
| 72 | O-RING ADJUSTMENT SCREW | 2 |
| 73 | FLOW CONTROL ADJ. SCREW | 2 |
| 74 | CUSHION ADJUSTMENT SCREW | 1 |
| 75 | O-RING ADJUSTMENT SCREW | 1 |
| 76** | O-RING, RESERVOIR | 1 |
| 77** | CHECK BALL | 1 |
| 78** | CAP | 1 |
| 79** | STRAP | 1 |
| 80** | FILL PORT | 1 |
| 81** | O-RING | 1 |
| 82** | O-RING | 1 |
| 83** | BOLT, RESERVOIR | 2 |
| 84** | O-RING, BLEEDER SCREW | 1 |
| 85** | AIR BLEEDER SCREW | 1 |
| 86** | RESERVOIR HOUSING | 1 |
| 87 | END CAP | 1 |
| 88 | AIR BLEEDER SCREW | 2 |
| 89 | O-RING, BLEEDER SCREW | 2 |
| 90 | CHECK PLUG | 2 |
| 91 | O-RING, CHECK PLUG | 2 |
| 92 | CHECK SPRING | 2 |
| 93 | CHECK BALL | 2 |
| 94 | PLUG | 1 |
| 95 | O-RING | 1 |
| 96 | TRANSFER TUBE | 1 |
| 97 | O-RING, TRANSFER TUBE | 2 |
| 98 | WEAR RING | 4 |
| 99 | BREATHER | 1 |

## SPEED CONTROL ADJUSTMENT PROCEDURE

**CAUTION:** Before making any adjustment, release the pneumatic pressure. Never adjust port flow control adjustment screw or cushion adjustment screw out past flush with end cap or counterbore. Do not overtighten.

To control speed in either or both directions: Flow Control Adjustment Screw, #73, may be turned clockwise for slower rotational speed or counterclockwise for faster rotational speed.

When cushions are used with port flow control option, adjustment screws will be marked "C" and "P" respectively. Cushion Adjustment Screw, #74, can be turned clockwise for more cushion, counterclockwise for less cushion. Always set flow control adjustment screw at desired actuator speed prior to adjusting cushion, which acts through the last 30° of actuator stroke.

## ACCUMULATOR CHARGE PROCEDURE

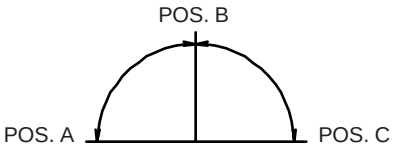
1. Remove Cap #78.
2. Attach fill gun, part #B161003. (filled with Mobil DTE-11M or equal), to fill port, #80.
3. Add oil to Spring Loaded Reservoir, #86.

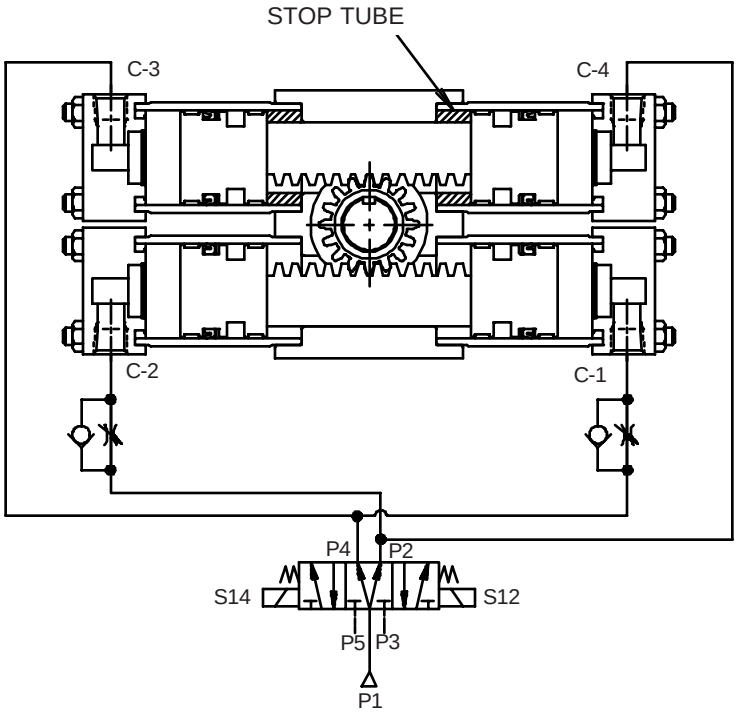
   **CAUTION:** Do not over-charge reservoir by extending fill mark past accumulator face. (See drawing)

4. Bleed Reservoir, #86, as required by rotating the Air Bleeder Screw, #85, counterclockwise until a smooth, air-free stream of oil is obtained.
5. Remove fill gun and replace cap.

## THREE POSITION ACTUATOR (3)

Recommended Operating Circuit




**OPERATION:**

A standard double rack unit is fitted with stop tubes on the upper rack, Energizing solenoid S14 connects valve port P4 to pressure, pressurizing actuator ports C1 and C3 (with ports C2 and C4 connected to exhaust), causing clockwise pinion rotation to angular position C. Alternately energizing solenoid S12 pressurizes actuator ports C2 and C4 (with C1 and C3 exhausted) causing counterclockwise rotation to angular position A. Position B is obtained by centering the control valve, which pressurizes all actuator ports. Pressure applied to the upper floating pistons centers the rack between the stop tubes. The lower rack is free floating as the forces are equal on both ends.

## SEAL KIT ORDERING INFORMATION

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

| PSK | - | PTR322 | - | V |
|---|---|---|---|---|
| Parker Seal Kit | | Base Model | | Omit = Standard<br>V = Viton<br>Q = Quad Ring Piston Seals<br>W = Carboxilated Nitrile Piston Seals |

# WARNING

FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF THE PRODUCTS AND/OR SYSTEMS DESCRIBED HEREIN OR RELATED ITEMS CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

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