Accord Controls
A Unit of Flowserve Corporation

765 South 100 East
Provo, Utah 84606

Phone: 801 373 4576
Facsimile: 801 489 2591
www.accord-controls.com

# AR5 Actuator

## AR5 Scotch-Yoke Actuator

The AR5 scotch-yoke actuator is an extension to the AR-series pneumatic scotch-yoke actuator. The AR5 actuator will produce up to 500,000 in.-lb. double acting torque and 225,000 in.-lb. spring end torque.

### Installation to Valve

1. All actuators are factory lubricated for life, but still should be protected from the elements and stored indoors until ready for use. The ports of the actuator are plugged as supplied from the factory. If actuators are stored for a long period of time prior to installation, the actuators should be stroked every 3 months to prevent the seals from taking set. See bulletin B00129 for long term storage instructions.

2. Prior to assembly, manually open and close valve to ensure freeness of operation. Be sure valve and actuator rotate in the same direction and are in the same position (i.e. valve closed, actuator closed).

3. Check the mounting surfaces, the stem adaptor, and the bracket to assure proper fit. Secure the valve in the closed position with the stem vertical. Bolt the bracket to the valve and place the stem adaptor on the valve stem. Position the actuator over the valve and lower to engage the stem adaptor to the actuator output bore. Continue to lower until the actuator seats on the bracket mounting surface. In order to align the bolt holes, it may be necessary to turn or stroke the actuator a few degrees and/or adjust the actuator travel stops. Bolt the actutor to the bracket.

4. Adjust the travel stop bolts of the actuator for the proper open and closed valve positions, per valve manufacturer's recommendations. Pneumatically stroke the actuator several times to assure proper operation. The stem adaptor should not bind during operation. If the actuator is equipped with an UltraSwitch or other accessories, adjust them at this time.

5. To prolong actuator life use only clean, dry plant air. Lubricated air is not required, however it is recommended particularly for high cycleapplications.
   *Caution: Do not use Lubricated air with Positioners.*

## Travel Stop Adjustments

All actuated valves require accurate travel-stop adjustments at both ends of the stroke to obtain optimum performance and valve seat life. The accumulation of tolerances in the adaption of actuators to valves is such that there must be a range of adjustments for both ends of the stroke to achieve optimum performance.

The AR5 actuator has travel stop adjustments in both the clock-wise and counter-clockwise directions. The 12 degree over-travel feature provides adjustments from -6 to +96 degrees.

## Field Conversion from Fail CW to Fail CCW

### (for Spring Return Actuators)

The AR5 spring return actuator can be converted from fail CW to fail CCW easily. Simply turn actuator over and mount to valve. This is easily accomplished due to identical valve and accessory mounting pattern machined in the body and cover. Follow steps below:

1. Disconnect all air and electrical supplies from actuator.

2. Remove any accessories from top actuator mounting surface.

3. If actuator is mounted to valve dismount actuator from valve.

4. Remove valve mounting bracket from bottom actuator mounting surface.

5. Turn actuator over so that the body cover is now facing down.

6. Install actuator to valve as described above, using valve mounting pattern on body cover. (Be sure actuator and valve are in same position)

7. Reinstall any accessories that were removed from actuator.

8. Check actuator for proper operation.

Accord Controls
A Unit of Flowserve Corporation

765 South 100 East
Provo, Utah 84606

Phone: 801 373 4576
Facsimile: 801 489 2591
www.accord-controls.com

# Maintenance Instructions

## Disassembly Instructions

1. Disconnect all air and electrical supplies from actuator.
2. Remove all accessories from actuator and dismount from valve.

### Spring Group

*NOTE: PERSONAL INJURY may result if Step 2 is attempted before Step I is completed.*

1. Apply air pressure to port DA2 to release spring pressure from the Stop Bolt (10). Remove both Stop Bolts (10) and release air pressure. This will relieve the majority of the spring preload.
2. The Spring Cartridge (47) is welded into an integral component and cannot be disassembled. To remove from actuator, remove Spring Cartridge Adapter Nuts (34) and Lockwashers (35). At this point, all spring forces are contained within the welded cartridge and the spring Cartridge can be removed from the center body.
3. Before reassembling Spring Cartridge to body, make sure stud threads are clean of any dirt, shavings, or other debris. Clean threads with rag and solvent if required, and lubricate threads with an anti-sieze compound.

*Note: Support the Spring Cartridge (47) during removal so as not to damage the Piston Rod (7).*

### Pressure Group

1. Check that all air is exhausted from the cylinder.
2. Remove the Tie Rod Nuts (37), Tie Rods (36), and the Endcap (30).
3. Slide the Cylinder (32) over and off the Piston (31), being careful not to scratch or dent the honed and chrome plated surface of the cylinder.
4. Remove the Piston Bolt (38) and Piston Bolt Lock-washer (39). Remove the Piston (31) and Piston Bolt Seal (44).
5. Remove the Adaptor Stud Nuts (34) and Lockwashers (35) and carefully slide the Adapter (29) over the Piston Rod (7).

### Housing (Body Group)

*NOTE: Spring Cartridge must be removed and air pressure must be removed from cylinders before the cover can be taken off the body.*

1. Remove cylinder Piston Rod (7) and spring side Piston Rod (7) from Yoke Block (4).
2. Remove Body Cover Bolts (18) and Lockwasher (19). Remove cover by turning cover jackscrews (40) until cover is separated enough to pry apart.
3. Remove Yoke Pin Rollers (5), Yoke Pin (6), and Yoke Block(4).
4. Lift Yoke (3) out of body bore.
5. Remove Yoke Seals (23) and Yoke Bushing (21).

### Reassembly Procedures

1. Inspect all parts for wear and replace any worn parts as needed. Normally, all seals and gaskets should be replaced when reassembling an actuator.
2. Clean and grease all components with a multipurpose "polymer" fortified grease such as DuBois Chemical® MPG-2. For low temperature units, use Dow Corning® 55 low temperature grease or equivalent.
3. Reverse the disassembly procedures to reassemble. Use the proper torque from the torque chart on the Tie Rod Locknuts (37), the Adapter Nuts (34), the Spring Cartridge Adapter Nuts (34), and the Piston Bolt (38). These threads should be lubricated with Locktite Threadlocker 242 or equivalent prior to assembly.
4. See parts and materials drawing which depicts all required spare parts.

Test the actuator for smooth operation and air leakage at service pressure before re-installing.

# Bolt Torques

| | Bolt Size | Torque Range |
|---|---|---|
| **Piston** | **Bolt (38)** (SAEGr.8 Bolt) | |
| | 1 1/4"-7 UNC | 1014-1116 ft.lb. |
| **Adapter Studs (34)** | (ASTM AI 93 Gr. B7) | |
| | 7/8"-9 UNC | 364-403 ft.lb. |
| **Tie Rods (36)** | (ASTM A311 Stressproof) | |
| | 7/8"-9 UNC | 336-371 ft.lb. |
| | 1"-8 UNC | 503-556 ft.lb. |
| | 1 1/4"-7 UNC | 503-556 ft.lb. |

Note:

14"-16" cylinders have 7/8"-9 Tie Rods
18"-22" cylinders have 1"-8 Tie Rods
24" cylinders have 1 1/4"-7 Tie Rods

Accord Controls
A Unit of Flowserve Corporation

765 South 100 East
Provo, Utah 84606

Phone: 801 373 4576
Facsimile: 801 489 2591
www.accord-controls.com

## How To Order:

| R5 | 22 | 14 | SR1 | H | V |
|---|---|---|---|---|---|
| (1) | (2) | (3) | (4) | (5) | (6) |

(1) AR5 - AR5 Model
(2) Cylinder Size
(3) Optional Dual Cylinder Size (blank if not present)
- 14 - 14" Cylinder
- 16 - 16" Cylinder
- 18 - 18" Cylinder
- 20 - 20" Cylinder
- 22 - 22" Cylinder
- 24 - 24" Cylinder

Note: larger cylinder is listed first, if present. See Torque Charts for available combinations.

(4) Fail-Safe Option
- DA - Double Acting
- SRxx Spring Return, where 'xx' denotes air pressure at balanced torque

(5) Override Option
- Blank - none
- H - Hydraulic Override

(6) Temperature Option
- Blank - standard -20° to -175°F (nitrile seals)
- V - high temperature 0° TO 300°F (viton)
- L - Low Temperature -55° to 175°F (low temp. nitrile)

(7) Trim Option
- Blank - standard materials, polyurethane paint
- E - standard materials, white epoxy coating
- G - standard materials, gray epoxy coating
- M - marine trim

Example: AR5 with dual 18" cylinders, double acting, with epoxy paint is **AR5I8I8DAE**.

Seal Kits:
Standard - AR(Actuator Base Model)SKB
High Temp - AR(Actuator Base Model)SKV
Low Temp - AR(Actuator Base Model)SKL

Example: High Temp. viton seal kit for AR522145R80 is **AR52214SKV**.

## Actuator Weights and Volumes

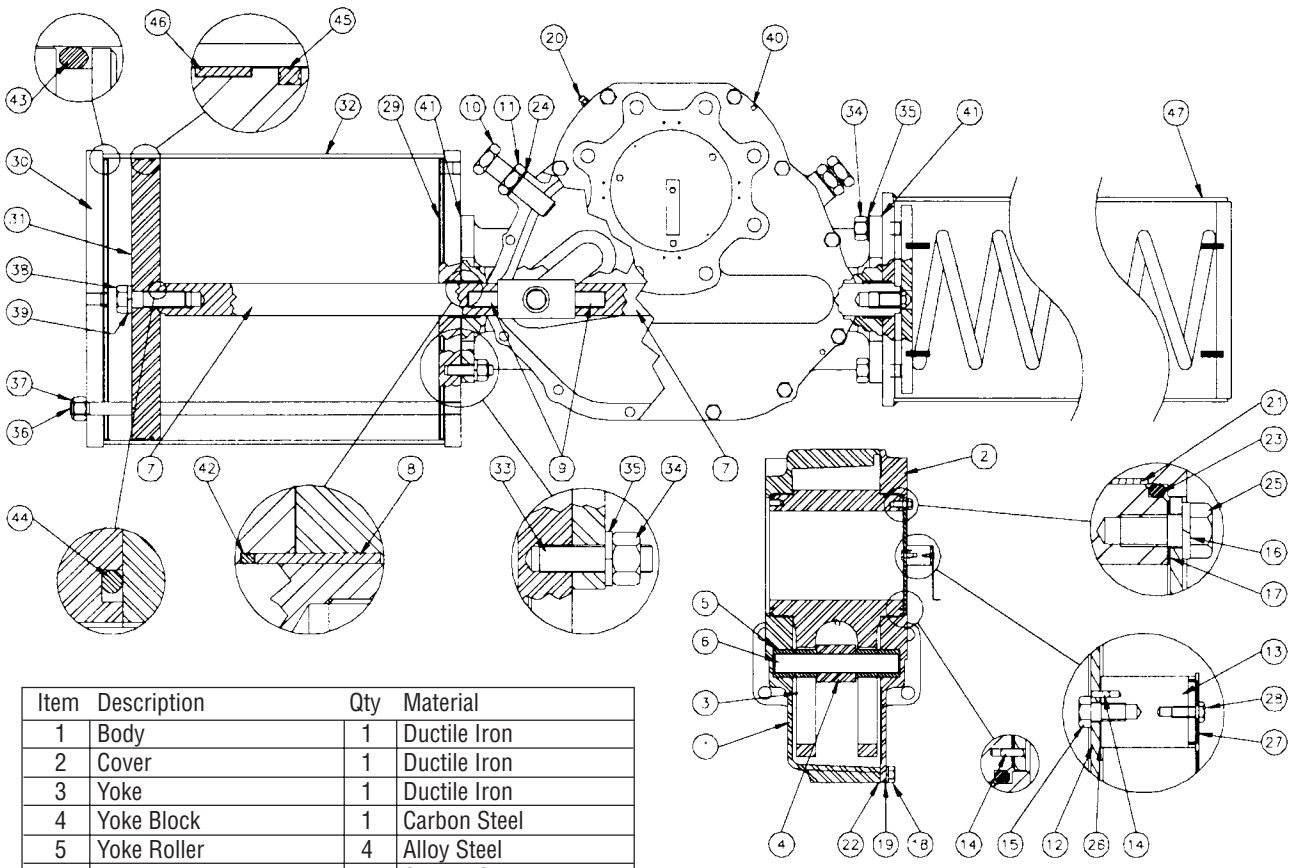
| Actuator Model | Volume ($in^3$) | Weights (lb.) | | | | |
|---|---|---|---|---|---|---|
| | | DA | SR40 | SR60 | SR80 | SR100 |
| AR514 | 3,233 | 932 | N/A | N/A | N/A | N/A |
| AR51414 | 6,466 | 1,199 | N/A | N/A | N/A | N/A |
| AR516 | 4,222 | 1,066 | N/A | N/A | N/A | 2,040 |
| AR51614 | 7,455 | 1,333 | N/A | N/A | N/A | N/A |
| AR51616 | 8,444 | 1,467 | N/A | N/A | N/A | N/A |
| AR518 | 5,344 | 1,180 | 1,938 | 1,992 | 2,153 | 2,260 |
| AR51816 | 9,566 | 1,581 | N/A | N/A | N/A | N/A |
| AR51818 | 10,688 | 1,695 | N/A | N/A | N/A | N/A |
| AR520 | 6,597 | 1,297 | 2,035 | 2,253 | 2,378 | 2,559 |
| AR52020 | 13,194 | 1,929 | N/A | N/A | N/A | N/A |
| AR522 | 7,983 | 1,463 | 2,276 | 2,437 | 2,725 | 2,888 |
| AR52214 | 11,216 | N/A | 2,704 | 2,992 | 3,274 | 3,437 |
| AR524 | 9,500 | 1,730 | 2,686 | 2,811 | 3,155 | 3,274 |
| AR52416 | 13,722 | N/A | 3,212 | 3,556 | 3,838 | N/A |

Accord Controls
A Unit of Flowserve Corporation

765 South 100 East
Provo, Utah 84606

Phone: 801 373 4576
Facsimile: 801 489 2591
www.accord-controls.com

# Parts and Materials



| Item | Description | Qty | Material |
|---|---|---|---|
| 1 | Body | 1 | Ductile Iron |
| 2 | Cover | 1 | Ductile Iron |
| 3 | Yoke | 1 | Ductile Iron |
| 4 | Yoke Block | 1 | Carbon Steel |
| 5 | Yoke Roller | 4 | Alloy Steel |
| 6 | Yoke Pin | 1 | Carbon Steel |
| 7 | Piston Rod | 1 | Carbon Steel |
| 8 | Rod Bushing | 1 | Bronze |
| 9 | Rod Stud | 1 | Alloy Steel |
| 10 | Stop Bolt | 2 | Alloy Steel |
| 11 | Stop Bolt Locknut | 2 | Carbon Steel/Zn |
| 12 | Indicator Plate | 1 | Carbon Steel |
| 13 | Accessory Coupler | 1 | Carbon Steel |
| 14 | Roll Pin | 3 | Alloy Steel |
| 15 | Coupler Bolt | 1 | Carbon Steel |
| 16 | Lockwasher | 3 | Carbon Steel/Zn |
| 17 | Indicator Plate Gasket | 1 | Gasket Material |
| 18 | Body Cover Bolt | 12 | Carbon Steel |
| 19 | Lockwasher | 12 | Carbon Steel/Zn |
| 20 | Pressure Relief Valve | 1 | Brass/Nitrile |
| 21 | Yoke Bushing | 2 | Steel/Teflon/Bronze |
| 22* | Cover Gasket | 1 | Gasket Material |
| 23* | Yoke Seal | 2 | Nitrile |
| 24* | Stop Bolt Thread Seal | 2 | Steel/N Nitrile |
| 25 | Indicator Plate Bolt | 3 | Carbon Steel |
| 26* | Coupler Gasket | 1 | Gasket Material |
| 27 | Indicator | 1 | Carbon Steel |

| Item | Description | Qty | Material |
|---|---|---|---|
| 28 | Indicator Bolt | 1 | Carbon Steel |
| 29 | Adapter | 1 | Carbon Steel |
| 30 | Endcap | 1 | Carbon Steel |
| 31 | Piston | 1 | Carbon Steel |
| 32 | Cylinder | 1 | Carbon Steel/Chrome |
| 33 | Adapter Stud | 8 | Carbon Steel |
| 34 | Adapter Nut | 8 | Carbon Steel |
| 35 | Lockwasher | 8 | Carbon Steel/Zn |
| 36 | Tie Rod | 4 | Carbon Steel |
| 37 | Tie Rod Nut | 4 | Carbon Steel |
| 38 | Piston Bolt | 1 | Carbon Steel |
| 39 | Lockwasher | 1 | Carbon Steel/Zn |
| 40 | Cover Jackscrews | 4 | Stainless Steel |
| 41 | Adapter Gasket | 1 | Gasket Material |
| 42 | Piston Rod Seal | 1 | Nitrile |
| 43* | Endcap Seal | 2 | Nitrile |
| 44* | Piston Bolt Seal | 1 | Nitrile |
| 45* | Piston Seal | 1 | Nitrile |
| 46 | Piston Wear Band | 1 | Teflon |
| 47 | Spring Cartridge | 1 | Carbon/Alloy Steel |

*Recommended spare parts