

## Gear Train Actuator Valve Linkages General Instructions

### APPLICATION

The AV-321, AV-327, AV-329 and AV-330 linkages are used to field install Barber-Colman gear train actuators to Barber-Colman valve bodies.

### ACCESSORIES

The actuators and the valve (see Table 2 for current valves and Table 3 for obsolete valves) should be purchased separately.

### CLOSE-OFF RATINGS

See Table 2 for the close-off ratings on current valves.

**TABLE 1. RESTRICTIONS ON THE MAXIMUM AMBIENT TEMPERATURE FOR THE ACTUATORS**

Maximum Temperature of Media in the Valve (Check Ratings of Valve)	Maximum Ambient for Actuator
260°F (126°C)	136° F (57° C)
281°F (138°C)	125° F (52° C)
300 to 366 °F (149 to 185°C)	100° F (37° C)

### PRE-INSTALLATION

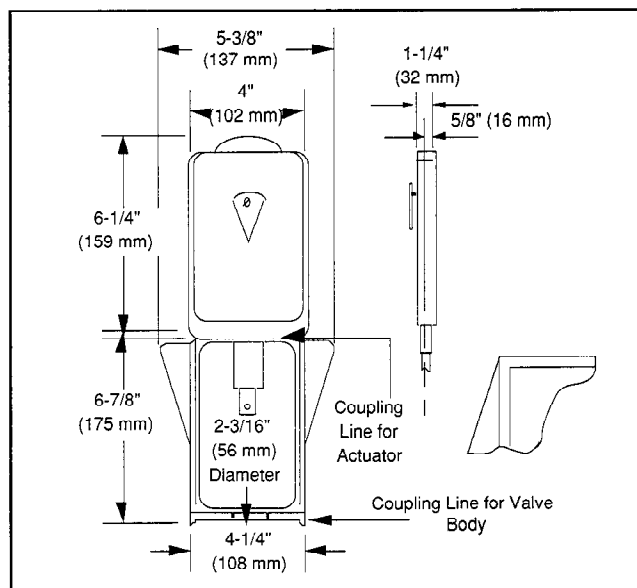
#### Inspection

Inspect the package for damage. If damaged, notify the appropriate carrier immediately. If undamaged, open the package and inspect the device for obvious damage. Return damaged products.

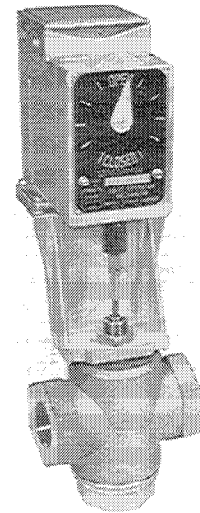
#### Required Installation Items

Tools (not provided):

- Appropriate wrenches for stem extensions, lock nuts, packing nuts and bracket nuts.
- Appropriate screwdriver for actuator mounting screws.



**Figure 1. Mounting Dimensions**



### INSTALLATION

Verify that fluid temperature of the media in the valve versus the ambient temperature at the actuator does not exceed the ratings shown in Table 1. Refer to Tables 2 and 3 to make sure the valve, valve linkage and the actuator are compatible. See Table 2 to determine if close-off is adequate.

#### CAUTION

- Installer must be a qualified, experienced technician.
- Avoid locations where excessive moisture, corrosive fumes or vibration are present.
- Install all 2-way valves so that they close against the flow. An arrow on the valve body or a tag indicates the proper flow direction.
- Always install 3-way mixing valves with two inlets and one outlet.
- Always install 3-way diverting valves with one inlet and two outlets.
- The actuators can be mounted in any position above the centerline of the valve body. For steam applications only, mount the actuator above the valve body at 45° from vertical. When selecting a location, allow sufficient room for accessories and for service of the product.

**TABLE 2. LINKAGE SELECTION AND VALVE CLOSE-OFF RATINGS**

				TYPICAL ACTUATOR * PART NUMBERS	TYPICAL ACTUATOR * PART NUMBERS	TYPICAL ACTUATOR ** PART NUMBERS
				<i>NORMALLY CLOSED (STEM DOWN)</i>	<i>NO NORMAL POSITION</i>	<i>NO NORMAL POSITION</i>
				MA-318, MA-318-500, MA-416 MA-416-500, MA-418, MA-418-500 MA-419, MA-419-500 MP-361, MP-461-600, MP-465 MP5-4651	MP-2150-500 MP-421 MP-422	MC-351, MC-421, MC-431 MC-4311, MC5-4311 MP-381, MP-382, MP-451 MP-452, MP-481-600, MP-485 MP-486, MP-4851, MP5-4851
				<i>NORMALLY OPEN (STEM UP)</i>		
				MA-318, MA-318-500, MA-416 MA-416-500, MA-418, MA-418-500 MA-419, MA-419-500 MP-371, MP-471-600, MP-475 MP5-4751		
<b>REQUIRED LINKAGE</b>				<b>AV-329 (AV-300 &amp; AV-29)</b>	<b>AV-329 (AV-300 &amp; AV-29)</b>	<b>AV-330 (AV-300 &amp; AV-30)</b>
<b>VALVE BODY INFORMATION</b>				<b>CLOSE-OFF PRESSURE PSI</b>	<b>CLOSE-OFF PRESSURE PSI</b>	<b>CLOSE-OFF PRESSURE PSI</b>
VALVE BODY PART NUMBER	DESCRIPTION	Cv	SIZE			
VB-9323-0-5-12	3-WAY, DIVERTING	"U"=68, "L"=75	2 -1/2"	125	125	125 (USE CAM MARKED "44")
VB-9323-0-5-13	125 LB. FLANGED	"U"=85, "L"=95	3"	125	125	125 (USE CAM MARKED "44")

\* Actuator must have a travel of 180° with a minimum torque of 50 lb.-in.

\*\* Actuator must have a travel of 180° with a minimum torque of 100 lb.-in.

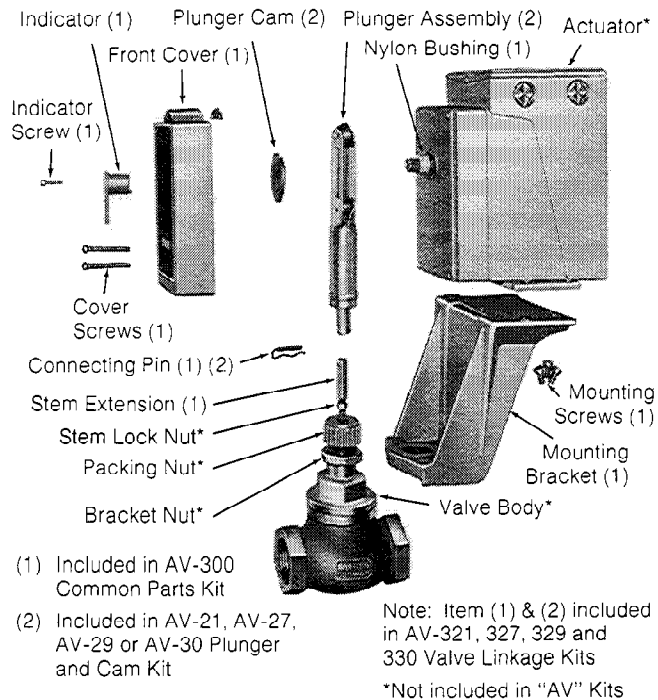
**TABLE 3. OBSOLETE VALVES COMPATIBLE WITH THE LINKAGES**

Valve Body Part Number	Valve Assembly Part Numbers			Valve Sizes	Required Linkage for Actuators * with 180° Stroke and a Minimum Torque of 50 Lb.-In.			Required Linkage for Actuators # with 180° Stroke and a Minimum Torque of 100 Lb.-In.
					AV-321 or AV-300 & AV-21	AV-327 ** or AV-300 & AV-27	AV-329 or AV-300 & AV-29	AV-330 or AV-300 and AV-30
					DYBB-121 DYBB-123 OYBB-109 OYBB-110 OYBB-113 OYBB-114 OYBB-115 OYBB-116 OYBB-119 OYBB-120 VB-202-0-1-P VB-212-0-1-P VB-804-0-1-P VB-807-0-1-P	VA-20 VA-100 VA-2001 VA-2021 VA-2101 VA-2121 VA-3041 VA-8041 VC-20 VC-21 VC-100 VC-2004 VC-2006 VC-2007	VC-2004 VC-2104 VC-2106 VC-2107 VC-2124 VC-3044 VC-3047 VC-8044 VP-82 VP-100 VP-2024 VP-2026	VP-2124 VP-3044 VP-3046 VP-8044 VS-2023 VS-8043 VU-82 VU-2024 VU-2124 VU-3044 VU-8044
CYBC-372 CYBC-374 CYBC-375 CYBC-406 CYBC-408 CYBC-409 DYBB-140 DYBB-142 VB-202-0-2-P VB-804-0-2-P	VC-20 VC-100 VC-2004 VC-2006 VC-2007 VC-2004 VC-2024 VC-8044	VP-82 VP-100 VP-2024 VP-2026 VP-3044 VP-3046 VP-8044 VS-2023 VS-8043 VU-82	VU-2024 VU-3044 VU-8044	2-1/2" to 4"	No	No	Yes	Yes (Use Cam Marked "44")
VB-817	VA-8171 VC-8174	VP-8174 VS-8173	VU-8174	1/2" to 3"	No	No	Yes	Yes (Use Cam Marked "44")
OYBB-276 VB-260	VC-2604			1" to 1-1/2"	Yes	No	No	Yes (Use Cam Marked "39")
OYBB-309 VB-262	VP-2624			1/2" to 2"	Yes	No	No	Yes (Use Cam Marked "39")

\* Typical Actuators: MA-318, MA-318-500, MA-416, MA-416-500, MA-418, MA-418-500, MA-419, MA-419-500, MP-361, MP-361-304, MP-367, MP-371, MP-371-304, MP-377, MP-421, MP-422, MP-461-600, MP-461-621, MP-465, MP-465-304, MP-471-600, MP-471-621, MP-475, MP-475-304, MP-2110-601, MP-2110-621, MP-2150-500, MP5-2151-500, MP5-4651, MP5-4751, MU-47102

# Typical Actuators: MC-351, MC-421, MC-431, MC-4211, MC-4311, MC5-4311, MP-381, MP-381-304, MP-382, MP-387, MP-451, MP-452, MP-481-600, MP-481-621, MP-485, MP-485-304, MP-486, MP-4851, MP5-4851, MU-48102, MU-48103, MU-48104, MU-48105, MUP-48101, MUP-48102, MUP-48103, MUP-48104, MUP-48105, MUP-48106, MUP-48202, MUP-48203, MUP-48204

\*\* AV-327 Neutral Band Linkage closes the bottom seat of the valve approximately 40° before the CW end of actuator rotation to allow setting of the auxiliary switch in the last 40° of rotation to start a DX compressor, etc.



**Figure 2. Assembly of AV-321, AV-327, AV-329 and AV-330 to Obsolete Valves**

**Assembly Procedure**

1. Mount the bracket on the valve body by removing the packing nut and the bracket nut, placing the bracket on the valve body, and replacing and tightening the valve bracket nut and subsequently replacing the packing nut.

**NOTE**

Position the bracket to a position that will make the wiring of the actuator convenient.

2. Thread stem lock nut and stem extension down fully on valve stem.
3. Place actuator on mounting bracket. Fasten actuator to mounting bracket with the three 1/4"-20 screws. DO NOT TIGHTEN SCREWS.
4. Place nylon bushing on actuator shaft.

**NOTE**

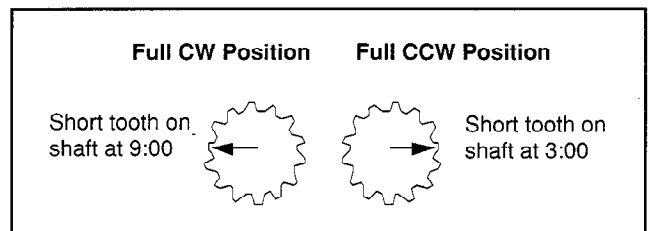
MA-31X and MA-41X actuators require that a "C" ring be installed on actuator shaft before placing nylon bushing on shaft.

5. Position the actuator to the 3:00 (CW) or 9:00 (CCW) position that will have plunger cam pointing down. Use Figure 3 and Table 4 to determine if the 3:00 (CW) or 9:00 (CCW) is the correct position for plunger cam to be pointing down for the application.
6. Place the plunger cam in the plunger, and slip the plunger cam on the actuator shaft with the cam pointing down.

**NOTE**

For AV-330 (AV-300 and AV-30) see Tables 2 and 3 for selection of correct cam.

7. Push the valve stem completely down against valve (lower) seat.
8. Screw stem extension until the holes the stem extension and plunger line up.
9. Turn the stem extension up (CCW) two full turns for 1/2" to 2" valves and 1-1/2 turns for 2-1/2" to 4" valves into the plunger.
10. Raise the actuator up until the connecting pin can be inserted through the holes in the plunger and stem extension.
11. Tighten the actuator mounting screws.
12. Tighten the lock nut against the stem extension.
13. Place front cover over plunger assembly and fasten to the actuator with two self-tapping screws.
14. Install the position indicator to end of the actuator shaft pointing to "Closed" (3-way valve could be pointing to "Open") and secure with screw.



**Figure 3. Actuator Shaft Position (Front View)**

**TABLE 4. CAM POSITION ON ACTUATOR SHAFT**

Actuator Shaft Position	Std. Factory Positions of Cam except for Normally Closed Valves w/MA-3XX, 4XX Actuators	Opt. Cam Position used to reverse Control Action (Std. for Normally Closed Valve w/MA-3XX, 4XX)
<b>CW</b> Short tooth on actuator shaft at 9:00	 (Cam Down)	(Cam Up) 
<b>CCW*</b> Short tooth on actuator shaft at 3:00	(Cam Up) 	(Cam Down) 

\*Stem down at CCW end of strokes is not available with AV-327.

## CHECKOUT

1. Drive the actuator so that valve stem is fully up (actuator in 3:00 or 9:00 position). If the valve is a three-way, check for plunger compression (see Figure 4).
2. Drive the actuator so that valve stem is fully down (actuator in 3:00 or 9:00 position). Check for plunger compression (see Figure 5).

## Compression Check

### NOTE

Check the plunger spring compression (Figures 4 and 5). The length of the stem extension should be adjusted so that valve disc seats before the actuator reaches the end of the closing stroke. The balance of the actuator travel is taken up in the plunger spring compression which should be approximately 1/16" (1.6 mm). This provides pressure on the disc in the closed position(s) and also compensates for disc and seat wear. On three-way valves spring compression must be provided on both upper and lower seats.

## MAINTENANCE

This is a quality product. Regular maintenance of the total system is recommended to assure sustained optimum performance.

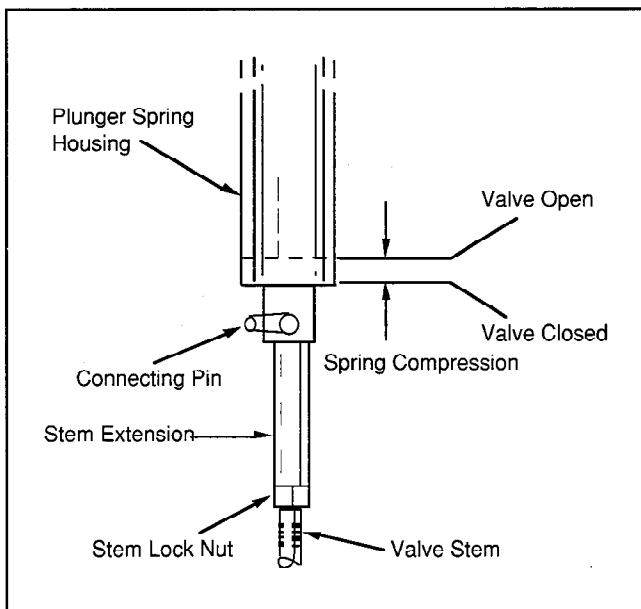


Figure 4. Plunger Spring Compression (Valve Stem Up)

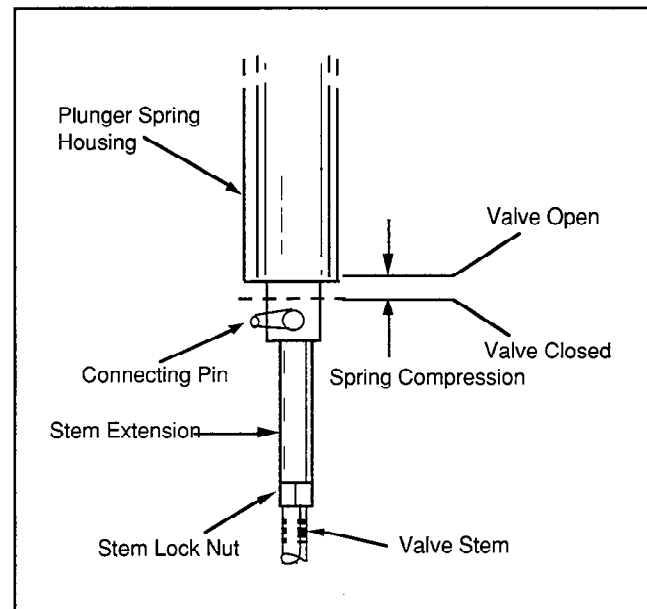


Figure 5. Plunger Spring Compression (Valve Stem Down)