

### Application

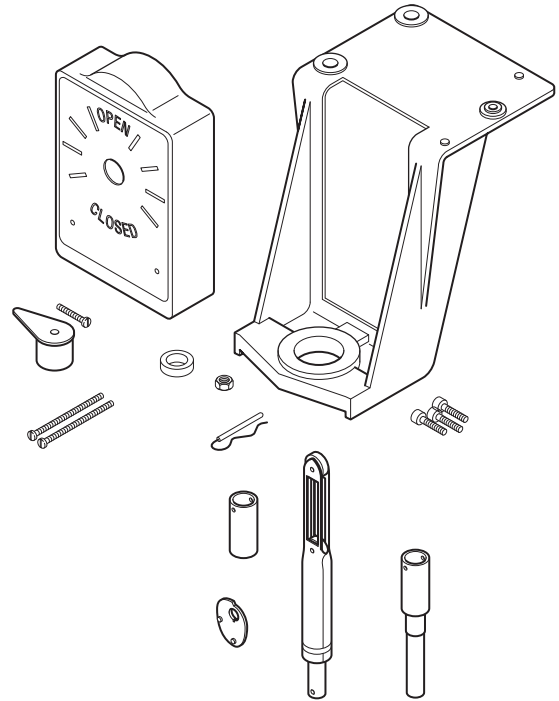
The AV-29x linkages are used to field assemble Schneider Electric gear train hazardous location actuators to VB-7xxx series or select VB-9xxx series valve bodies.

### Features

- Die cast aluminum mounting bracket.
- Valve position indication provided as standard.

### Applicable Literature

- *EN-56-2 Apparatus for Use in Hazardous Locations*, F-18451
- *MAx-305 & MAx-318 Series MAx-405 through MAx-419 Series, Two-Position Actuators General Instructions*, F-06491
- *MC-351, 421, 431, MC-4311 Three-Wire, Two Position Actuators General Instructions*, F-08366
- *MP-3xx and MP-4xx Series Reversible and Proportional Electric Actuators*, F-15479
- *Valve Products Catalog*, F-27384
- *EN-205 Water System Guidelines*, F-26080



# SPECIFICATIONS

**Table-1 Model Chart.**

Valve Linkage Model Number	Description Complete Linkages	Stem Force (lb.)
AV-291	VB-7xxx 1/2" to 2"	150
AV-293		300
AV-295	VB-9xxx 2-1/2" to 3" bronze VB-9313 2-1/2" to 4" cast iron flanged	150
AV-296		300

## Temperature Restrictions

Verify that the fluid temperature of the media in the valve versus the ambient temperature at the actuator does not exceed the ratings shown in Table-2.

**Table-2 Restrictions on Maximum Ambient Temperature for Actuators.**

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

## Close-off Pressure Rating

Close-off pressure ratings are listed in Table-3. Check the appropriate table to verify that the selected valve, valve linkage, and actuator provide adequate close-off pressure for your application.

The actuator with hazardous location housing, valve, and valve linkage should be purchased separately. See Table-3 for selections.

## Required Components

## 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.

### Requirements

- Tools (not provided):
  - Appropriate wrenches for stem extensions, lock nuts, packing nuts, and brackets
  - Appropriate screwdriver for actuator mounting screws
  - TOOL-37, 1-5/8" open-ended wrench with a maximum thickness of 3/16"
- Training: Installer must be a qualified, experienced technician

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### Caution:

- Install the unit in accordance with the National Electric Code Article 500 and all applicable local codes.
  - Avoid locations where excessive moisture, corrosive fumes, or vibration is present.
  - Install all two-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 three-way mixing valves with two inlets and one outlet.
  - Always install three-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 where the ambient temperature approaches the limit of the actuator, the valve stem should be mounted 45° from vertical. When selecting a location, allow sufficient room for accessories and for service of the product.
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**Table-3 Linkage Selection and Valve Close-Off Pressure Ratings for VB-7xxx and VB-9x1x Valve Bodies.**

					TYPICAL ACTUATOR PART NUMBERS <sup>a</sup>							
					Spring Return	No Normal Position	No Normal Position					
					MA8-318, MA8-318-500 MA8-418, MA8-418-500 MP6-361, MP6-367 MP6-371, MP6-377, MP6-379, MP6-465 MP7-4651 MP6-470, MP6-475, MP7-4751	MP6-421	MC6-351 MC6-421 MC6-431 MP6-381 MP6-485 MC7-4311					
<b>Minimum Torque/Travel Required</b>					50 lb.-in., 180° Rotation, 150 lb. Plunger		175/220 lb.-in., 180° Rotation, 300 lb. Plunger					
<b>Linkage for 1/2" to 2" VB-7xxx Series Valves</b>					AV-291		AV-293					
<b>Linkage for 2-1/2" to 3" VB-9xxx Series Bronze Body Valves</b>					AV-295		AV-296					
<b>Linkage for 2-1/2" to 4" VB-9313 Cast Iron Body Valves</b>					-							
VALVE BODY INFORMATION					CLOSE-OFF PRESSURE PSI (kPa)							
Valve Body Part Number	Description	P Code	Size	Cv								
VB-7213-0-4-P VB-7214-0-4-P VB-7215-0-4-P VB-7253-0-4-P VB-7273-0-4-P	2-Way	1	1/2"	0.4	250 (1724)	250 (1724)						
		2		1.3								
		3		2.2								
		4		4.4								
		5	3/4"	5.5								
		6		7.5								
		7	1"	10								
		8		14								
		9	1-1/4"	20			90 (621)	200 (1379)				
		10	1-1/2"	28			65 (448)	140 (965)				
		11	2"	40			35 (241)	80 (552)				
		12	2-1/2"	65			20 (137)	50 (345)				
		13	3"	85			12 (83)	34 (234)				
VB-7313-0-4-P VB-7314-0-4-P VB-7315-0-4-P	3-Way	2	1/2"	2.2	250 (1724)	250 (1724)						
		4		4.4								
		6	3/4"	7.5			220 (1517)					
		8	1"	14			150 (1034)	250 (1724)				
		9	1-1/4"	20			100 (689)	200 (1379)				
		10	1-1/2"	28			60 (414)	140 (965)				
		11	2"	41			33 (228)	80 (552)				
		VB-7323-0-4-P	3-Way	4			1/2"	4.4	250 (1724)	250 (1724)		
				6			3/4"	7.5				
				8			1"	15				
				9			1-1/4"	20				
10	1-1/2"			28								
VB-9313-0-4-P VB-9315-0-4-P	3-Way	12	2-1/2"	67	20 (137)	50 (345)						
		13	3"	91	12 (83)	34 (234)						
VB-9313-0-5-P	3-Way 125 lb. Flanged	12	2-1/2"	74	20 (137)	50 (345)						
		13	3"	101	12 (83)	34 (234)						
		14	4"	170	6 (41)	17 (117)						

<sup>a</sup> See Table-4 to set stem and cam position.

# ASSEMBLY PROCEDURE

## AV-291 and AV-293

**Note:** Position the bracket on the valve in such a way as to make it convenient to wire the actuator.

### Valve Linkage for 1/2" to 2" VB-7xxx

1. Mount the bracket on the valve body by screwing the mounting nut into the mounting bracket. Tighten the hex mounting nut, using a 1-5/8" open-ended wrench with a maximum thickness of 3/16" (TOOL-37). See Figure-1. Proceed to step 2 in AV29x Valve Linkage Common Procedure on page 6.

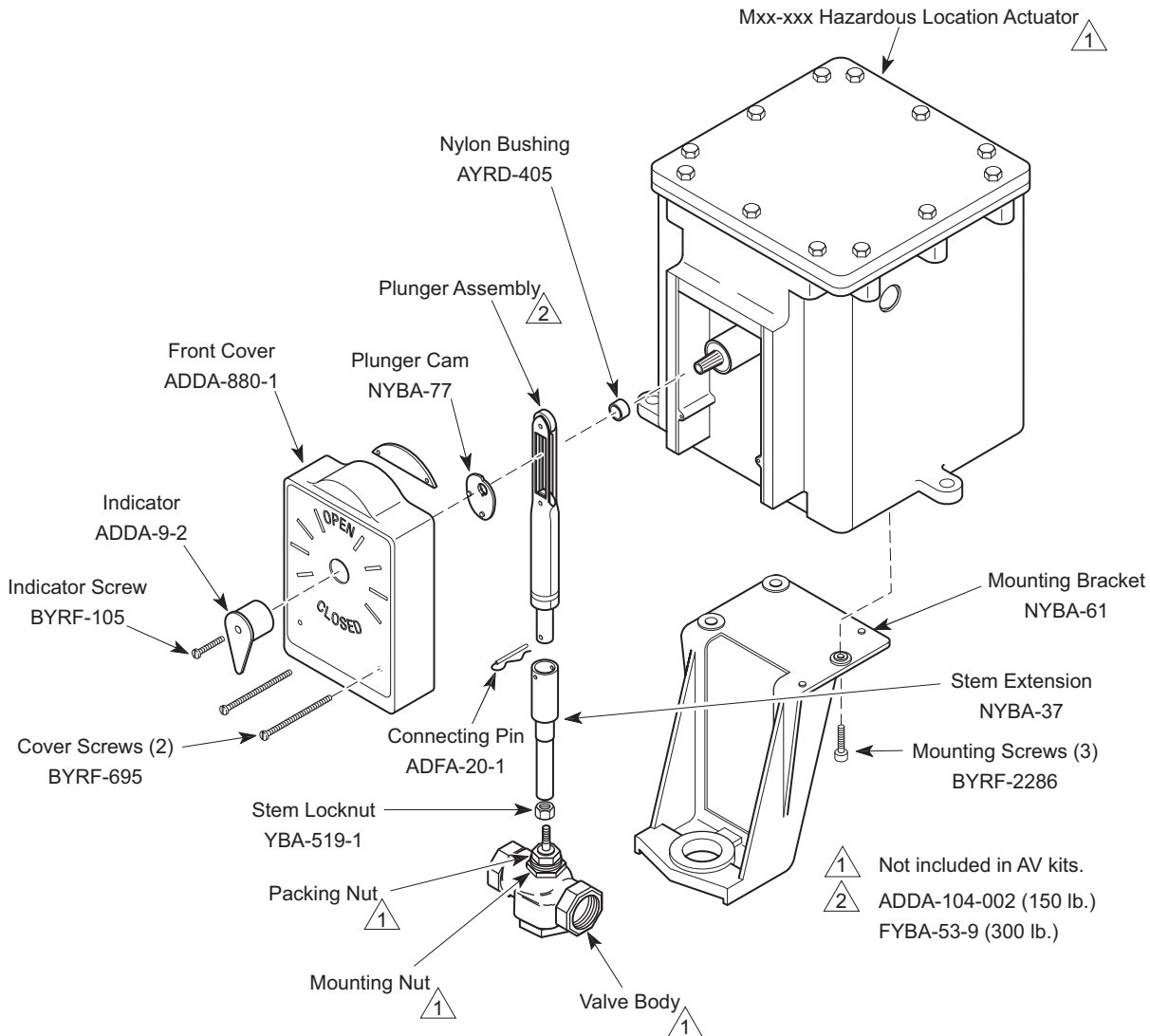


Figure-1 Valve Linkages for 1/2" to 2" VB-7xxx.

## AV-295 and AV-296 on Valve Bodies

### Valve Linkage for Current 2-1/2" to 4" VB-9x1x

1. Mount the bracket onto the valve body by removing the bracket nut, placing the bracket on the valve body, and replacing and tightening the valve bracket nut. See Figure-2. Proceed to step 2 in AV29x Valve Linkage Common Procedure on page 6.

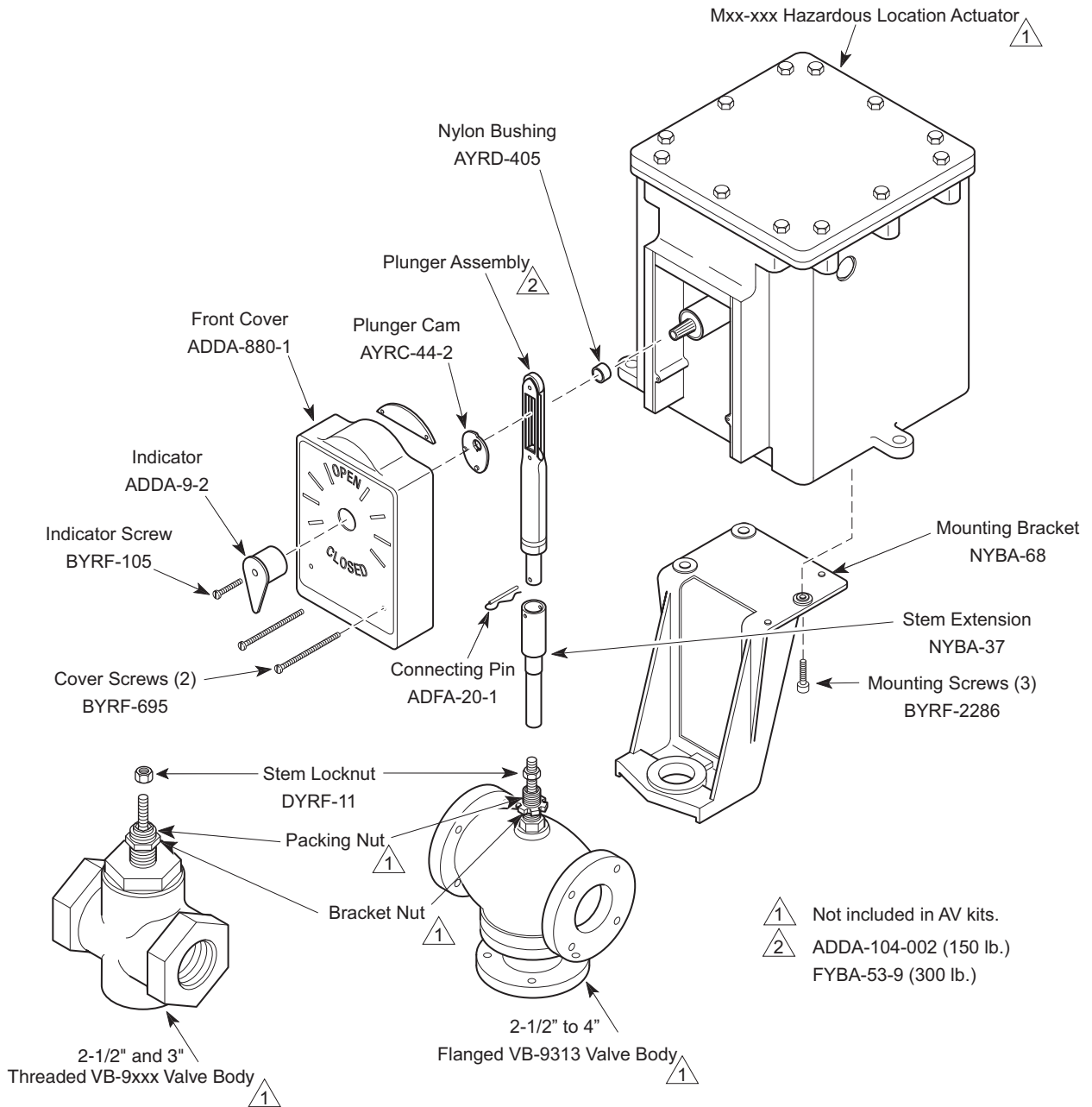


Figure-2 Valve Linkages for Current 2-1/2" to 4" VB-9313 Cast Iron Flanged, and VB-9xxx 2-1/2" and 3" Threaded Bronze Valve Bodies.

## AV29x Valve Linkage Common Procedure

The following steps are common to all AV-29x valve linkages. Perform step 1 on page 4 or 5 before proceeding to step 2.

2. Thread the stem lock nut and stem extension down fully onto the valve stem.
3. Place the actuator onto the mounting bracket. Fasten the actuator to the mounting bracket with the three mounting screws, BYRF-2286. Do not tighten the screws.
4. Place the nylon bushing onto the actuator shaft.
5. Position the actuator to the 3:00 (CW) or 9:00 (CCW) position so that the cam is pointing up or down as required. Use Figure-3 and Table-4.

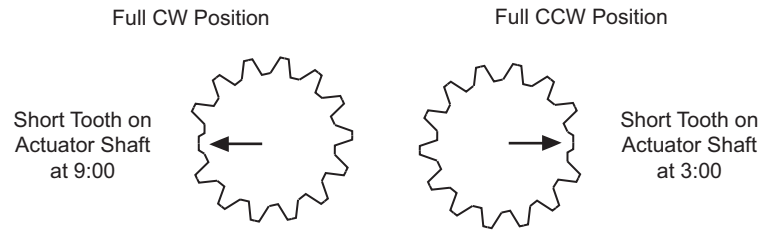


Figure-3 Actuator Shaft Position (Front View).

Table-4 Actuator Shaft and Cam Position.

Actuator Shaft Position	Valve Position	Cam/Valve Position	Valve Position	Cam/Valve Position
CW Short tooth on actuator shaft at 9:00	VB-7213 (closed) VB-7313 (B closed) VB-7323 (B to A open) VB-921x (closed) VB-931x (B closed)	 Cam Down	VB-7213 (open) VB-7313 (A closed) VB-7323 (B to AB open) VB-921x (open) VB-931x (A closed)	 Cam Up
CCW Short tooth on actuator shaft at 3:00	VB-7213 (open) VB-7313 (A closed) VB-7323 (B to AB open) VB-921x (open) VB-931x (A closed)	 Cam Up	VB-7213 (closed) VB-7313 (B closed) VB-7323 (B to A open) VB-921x (closed) VB-931x (B closed)	 Cam Down

6. Consult Table-5 for the proper cam. Place the cam in the plunger and slip the plunger cam onto the actuator shaft with the cam pointing to the required position.

**Table-5 Cam Selection.**

<b>Use Cam Marked</b>	<b>Included in Linkage Kits</b>	<b>For These Valve Bodies</b>	<b>With Nominal Stroke</b>
77	AV-291 and AV-293	1/2" to 2" VB-7xxx	1/2"
44-2	AV-295 and AV-296	2-1/2" to 4" VB-9xxx	1"

7. Push the valve stem completely down.
8. Screw the stem extension until the holes in the stem extension and plunger line up.
9. Turn the stem extension upward, counterclockwise, into the plunger 2 full turns.
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 stem lock nut against the stem extension.
13. Place the front cover over the plunger assembly and fasten it to the actuator with two cover screws, BYRF-695.
14. Install the position indicator to the end of the actuator shaft. See Table-4 for the correct position.

## CHECKOUT

Check to assure correct plunger spring compression. The length of the stem extension should be adjusted so that the valve disc seats before the actuator reaches the end of the stroke. The balance of the actuator stroke is taken up in the plunger spring compression, which should be approximately 1/16 inch (1.6 mm). This applies pressure on the disc in the closed position(s) and compensates for disc and seat wear. Refer to Figure-5 for VB-7213 (stem down closed). For three way applications (VB-73x3 or VB-9313) refer to Figure-4 and Figure-5.

### VB-7213 Example

1. Drive the actuator so the valve stem is fully down.
2. Observe the plunger spring compression as in Figure-5.

### VB-7313 Example

1. Drive the actuator so the valve stem is fully up.
2. Observe the plunger spring compression as in Figure-4.
3. Drive the actuator so the valve stem is fully down.
4. Observe the plunger spring compression as in Figure-5.

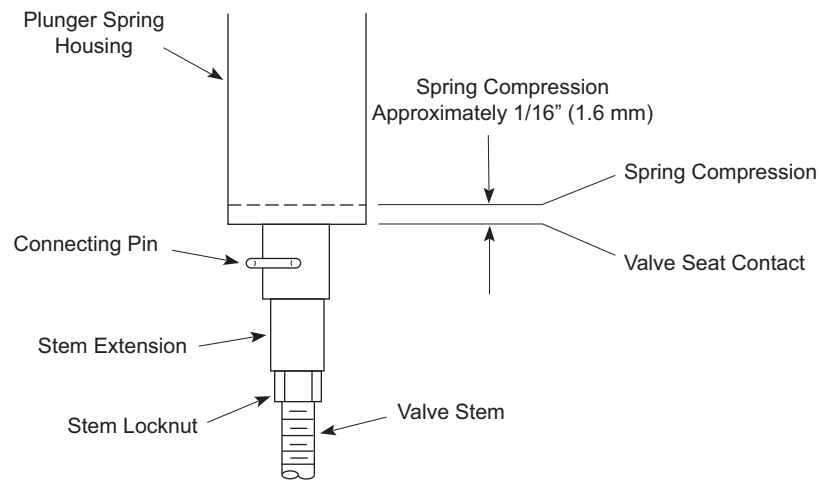


Figure-4 Valve Compression Stem Up.

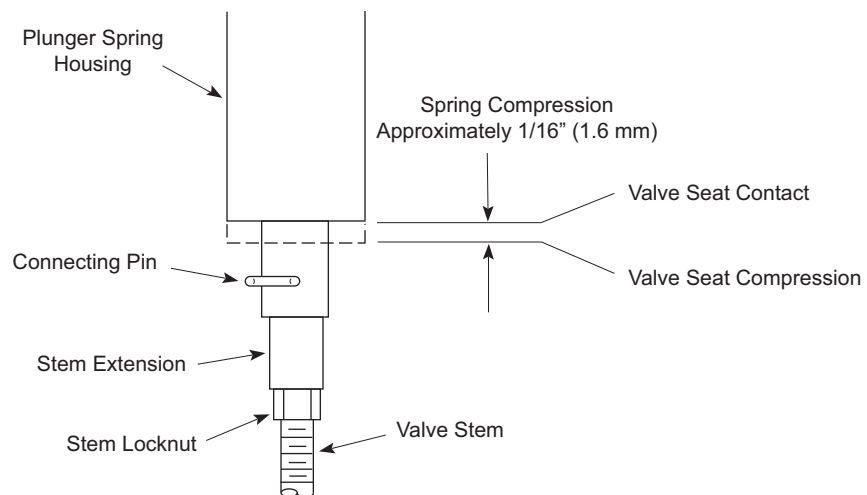


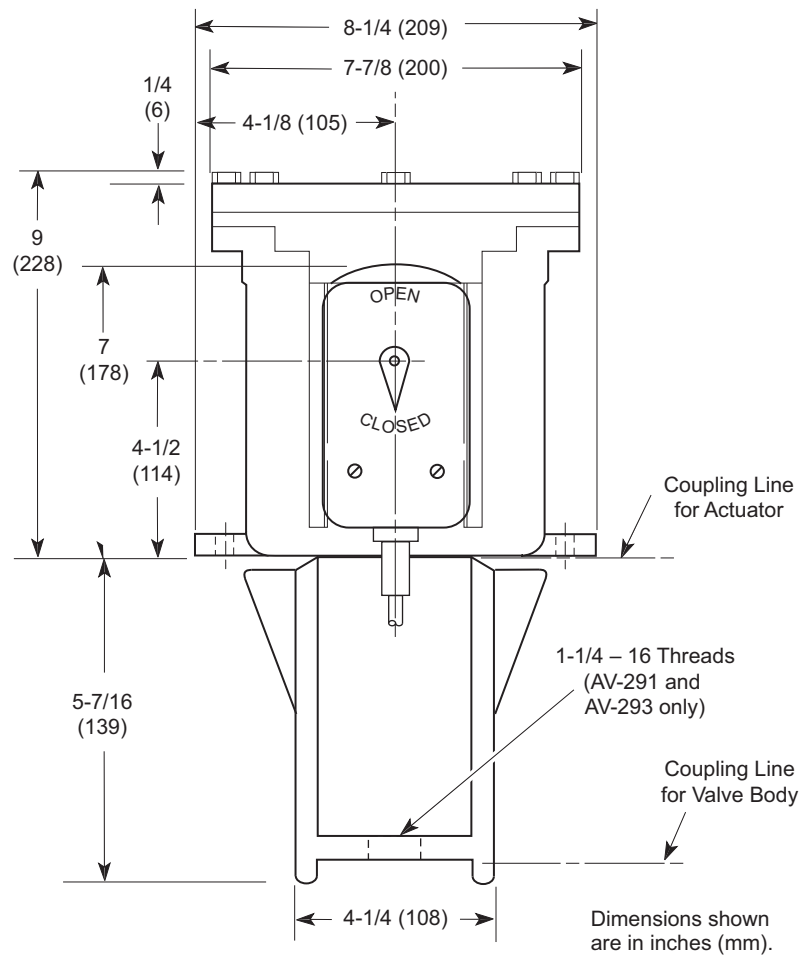
Figure-5 Valve Compression Stem Down.



## MAINTENANCE

Regular maintenance of the total system is recommended to assure sustained optimum performance.

## DIMENSIONAL DATA



Allow 12" (300) minimum service clearance above the housing top.

Figure-6 Front Dimensions.

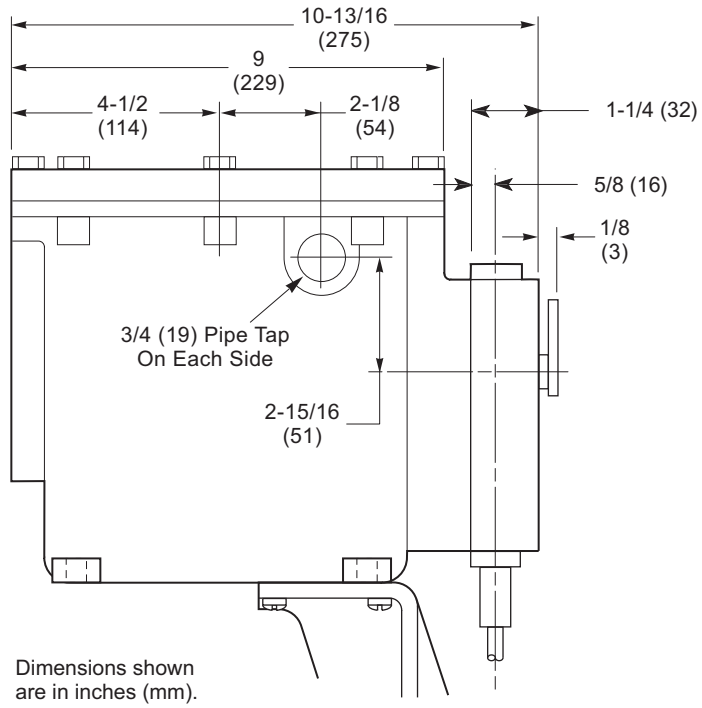


Figure-7 Side Dimensions.

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**Schneider Electric**  
 1354 Clifford Avenue  
 P.O. Box 2940  
 Loves Park, IL 61132-2940

[www.schneider-electric.com/buildings](http://www.schneider-electric.com/buildings)

