

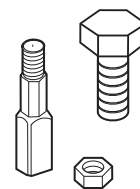
### Application

The AV-644 series linkage kits are required for the assembly of MF and MS-2xxxx model actuators to valves.

The AV-644 linkage kit replaces the AV-643 linkage kit with plastic stem extension for the assembly of MF and MS-223xx thermally isolated actuator models with manufacture date codes prior to 9812.

The AV-644 linkage kit replaces all linkages for MF and MS-2xxxx actuators, including thermally isolated models with manufacture date codes after 9832.

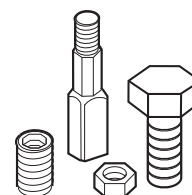
The AV-644-10 linkage kit replaces the AV-640 linkage kit for all MF-221xx actuator models.



AV-644

### Applicable Literature

- *MS-22353 Proportional Valve Actuator General Instructions, F-26263*
- *MF-22xx3 Series Floating Valve Actuator General Instructions, F-26264*
- *MF-23xx3 Series High Output Force Floating Valve Actuator General Instructions, F-26572*
- *Electric/Electronic Products Catalog, F-27382*



AV-644-10

---

*Note:* Obsolete linkages are displayed in Figure-1.

---

**Table-1 Valve Linkage Conversion Chart.**

Actuator Part Number	Manufacturing Date Code	Original Linkage <sup>a</sup>	Replacement Linkage
MF-22103 <sup>b</sup>	All	AV-640	AV-644-10 <sup>c</sup>
MF-22123 <sup>b</sup>	All	AV-640	AV-644-10 <sup>c</sup>
MF-2x203	After 9832	AV-644	AV-644 <sup>c</sup>
MF-22303	Prior to 9812	AV-643	AV-644 <sup>c</sup>
	9812 to 9832	AV-641	None <sup>d</sup>
MF-2x303	After 9832	AV-644	AV-644 <sup>c</sup>
MF-22323	Prior to 9812	AV-643	AV-644 <sup>c</sup>
	9812 to 9832	AV-641	None <sup>d</sup>
MF-2x323	After 9832	AV-644	AV-644 <sup>c</sup>
MS-22353	Prior to 9812	AV-643	AV-644 <sup>c</sup>
	9812 to 9832	AV-641	None <sup>d</sup>
	After 9832	AV-644	AV-644 <sup>c</sup>

<sup>a</sup> Refer to Figure-1 for obsolete valve linkage kit identification.

<sup>b</sup> Actuator drive screw is removable.

<sup>c</sup> The brass stem extension threads are coated with nylon

<sup>d</sup> Replacement linkage not available. Replace actuator

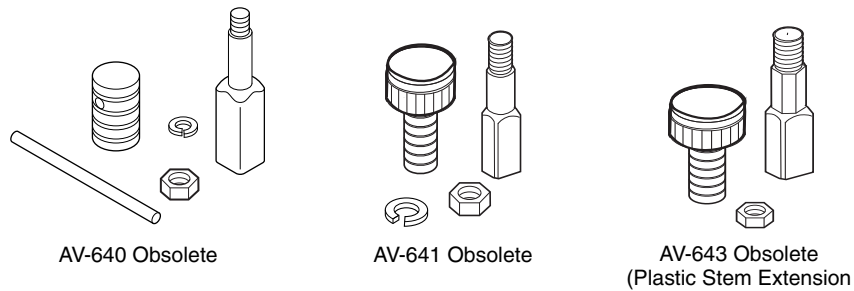


Figure-1 Obsolete Valve Linkage Kit Identification.

## ASSEMBLY/ADJUSTMENT INSTRUCTIONS

**Caution:** Damage can occur if an actuator equipped with a potentiometer (seven wires) is run or manually adjusted without being mounted to a valve. This causes the potentiometer output to be out of specification and requires the actuator position to be re-established. If an actuator is run or adjusted without being mounted to a valve, follow the “Re-establishing Potentiometer Position” procedure on Page-11 before mounting the actuator to the valve.

## Actuator Assembly

The following models use round ID drive screws (confirm by removing the indicator nut and looking at the center of the drive screw) that cannot be removed from the actuator.

Position the actuator above center line of valve to prevent damage from condensation and dripping water.

### Replacing AV-640 with AV-644-10 Valve Linkage on MF-221xx Actuators

1. Disconnect power from the actuator.
2. Verify actuator part number is of the MF-221xx series. The center of the drive screw and the center section of the stem extension should both be round.
3. Unscrew the position indicator nut on the top of the actuator and remove it. Insert FRAC-209-1 pin through the hole in the position indicator nut and loosen by hand. Refer to Figure-2 for part identification.

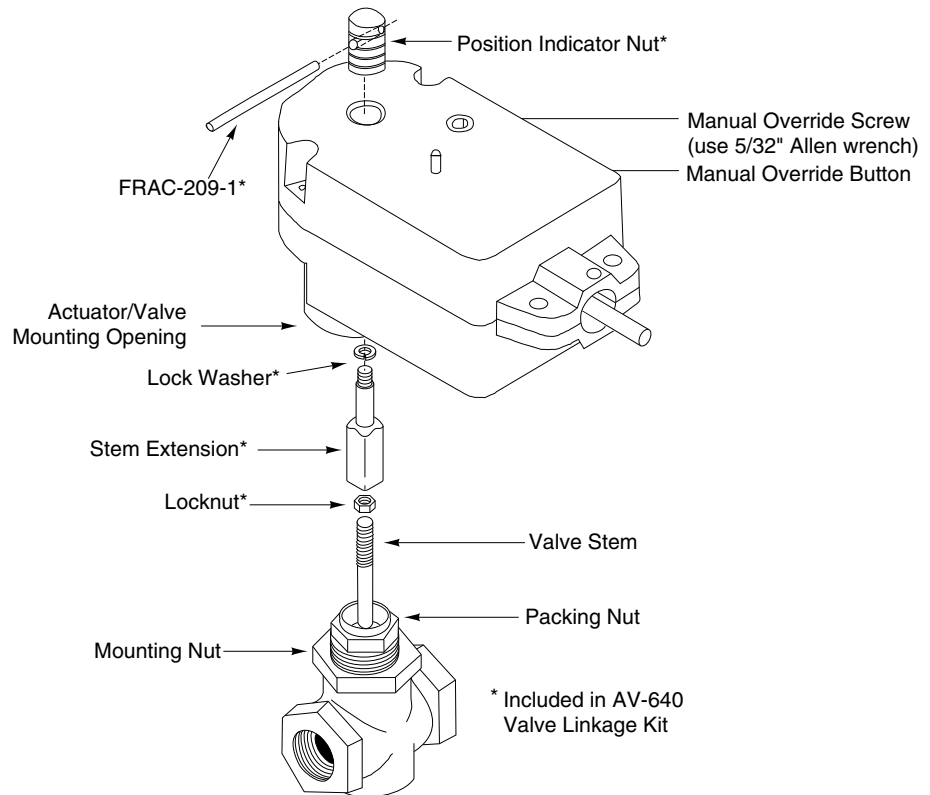


Figure-2 MF-221xx Series Actuator Valve Assembly with Obsolete AV-640 Linkage.

4. Unscrew the mounting nut from the actuator.
5. Remove the actuator from the valve. Lift the actuator to separate it from the valve and linkage.
6. Unscrew the stem extension and locknut to remove them from the valve stem.
7. Peel back the label on top of the actuator to expose the drive screw. Remove the drive screw from the actuator. Use a tapered pencil inserted in the center of the drive screw to unscrew it.
8. Discard the old position indicator nut, stem extension, lock washer, locknut, and drive screw.
9. Replace all the old parts with new parts from the AV-644-10 linkage kit in reverse order, starting with the white plastic drive screw. Refer to Figure-3.

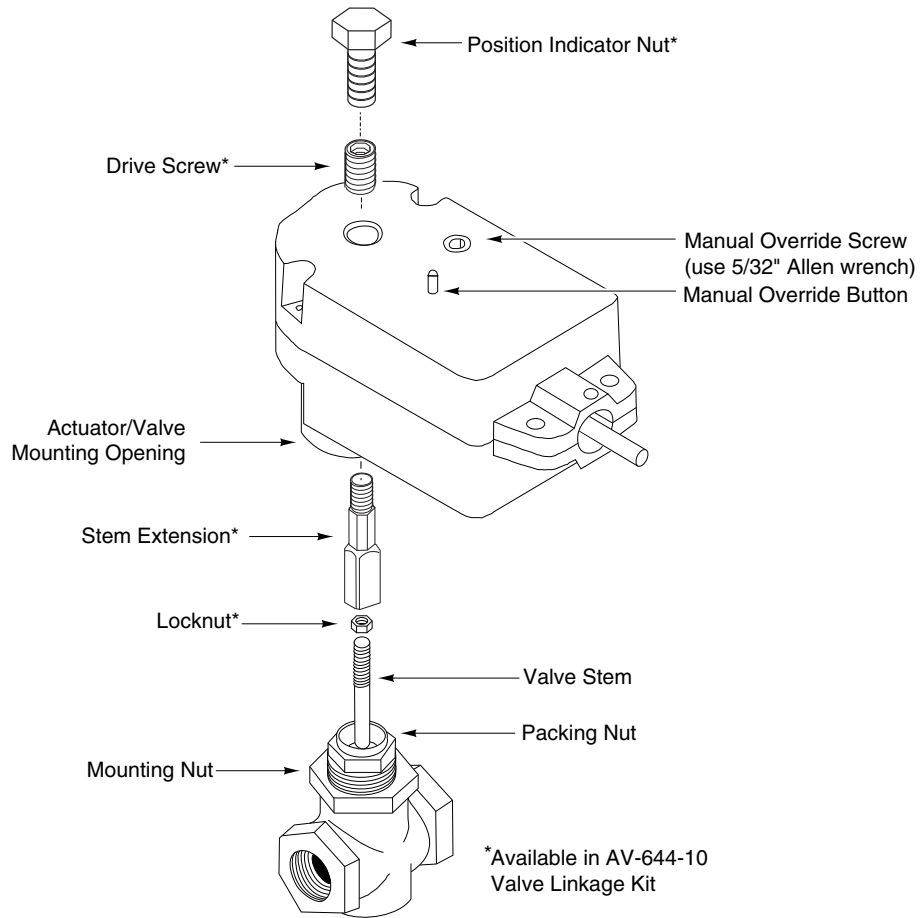


Figure-3 MF-221xx Series Actuator Valve Assembly with AV-644 Linkage.

10. Insert the drive screw into the actuator. Insert a tapered pencil or pen into the drive screw and rotate.
11. Confirm that the drive screw for the MF-221xx actuator is mounted the required distance from the top of the actuator case. See Figure-4. If the drive screw is not in position, insert a tapered pencil or pen into the drive screw and rotate.

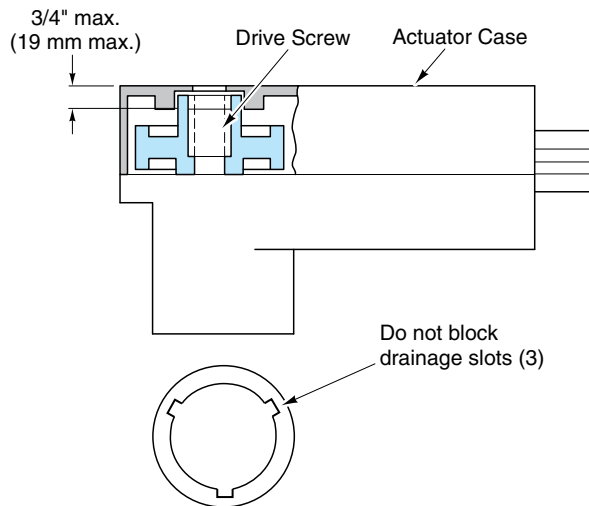


Figure-4 MF-221xx Actuator Drive Screw Position.

12. Position the valve stem in the down position. Place the locknut onto the valve stem.
13. Screw the stem extension onto the valve stem. Adjust the stem extension to the height specified for the selected actuator model. Refer to Figure-5. This dimension is the distance from the top of the packing nut to the shoulder of the stem extension.

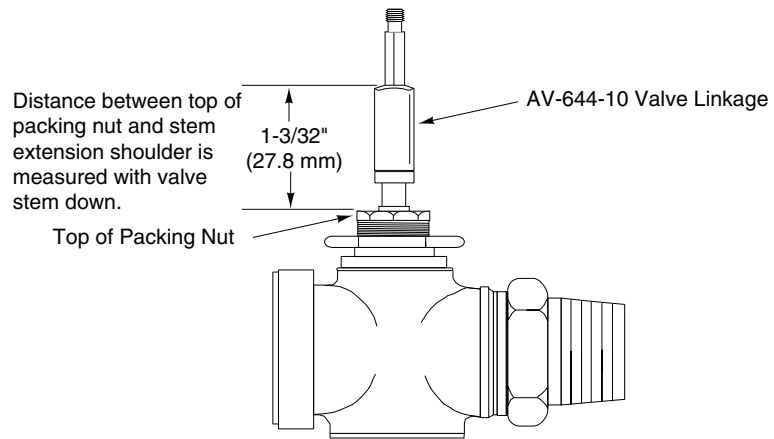


Figure-5 Stem Dimension Requirements for MF-221xx Series Actuators.

14. Tighten the locknut against the stem extension to make the stem extension secure to the valve stem.
15. Insert the valve stem extension through the bottom of the actuator. If necessary, rotate the drive screw slightly to align the hex in the drive screw to the square in the lower bearing to match the stem extension hex and square.
16. Screw the valve mounting nut into the actuator and tighten.
17. Position the indicator nut on top of the actuator.

---

**Caution:** The hex shaped interface between the stem extension and drive screw does not require high indicator nut tightening torque. Do not tighten the indicator nut beyond the hex shoulder on the stem extension or a reduction in the actuator output may result. See Figure-10 for parts identification.

---

18. Tighten the indicator nut against the shoulder on the stem extension.
19. Reconnect power to the actuator.

## Replacing AV-643 with AV-644 Valve Linkage on MF- and MS-22xx3 Actuators

1. Disconnect power from the actuator.
2. Remove the actuator from the valve. Unscrew the position indicator nut on the top of the actuator. Refer to Figure-6 for part identification.

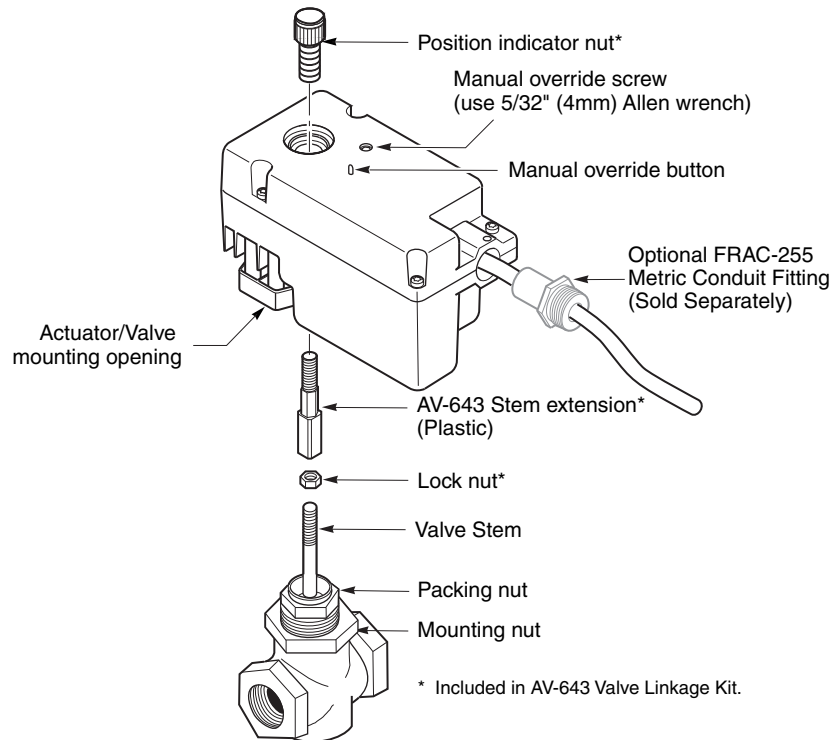


Figure-6 MF-22xx3 Series and MS-22353 Actuator Assembly Diagram with Obsolete AV-643 Linkage.

3. Unscrew the valve mounting nut from the actuator.
4. Remove the actuator from the valve. Lift the actuator to separate it from the valve and linkage.
5. Unscrew the stem extension and locknut to remove them from the valve stem.
6. Discard the old position indicator nut, stem extension, and locknut.
7. Replace all the old parts with new part from the AV-644 linkage kit in reverse order, starting with the locknut and stem extension. Refer to Figure-7.

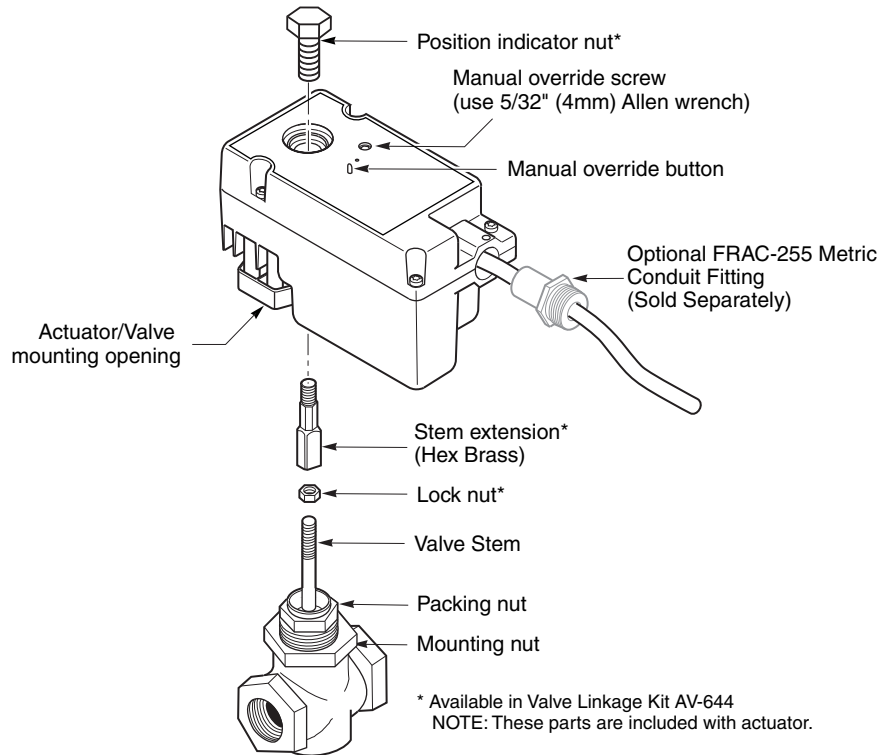


Figure-7 MF-22xx3 Series and MS-22353 Actuator Assembly Diagram.

8. Position the valve stem in the down position. Place the locknut onto the valve.
9. Screw the stem extension onto the valve stem. Adjust the height of the stem extension to 1-3/32" (27.8 mm). This dimension is the distance from the top of the packing nut to the shoulder of the stem extension. Refer to Figure-8 and the General Instructions for the actuator. See Applicable Literature on Page-1.

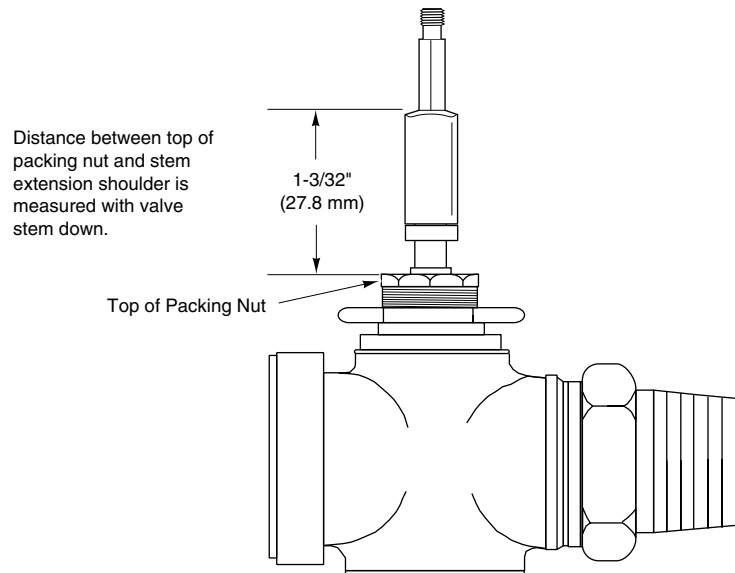


Figure-8 Valve and Stem Extension Assembly.

10. Tighten the locknut against the stem extension to make the stem extension secure to the valve stem.
11. Position the valve stem in the down position.

12. Confirm that the drive screw is at the required distance from the top of the actuator case. See Figure-9. If the drive screw is not in position, insert a tapered pencil or pen into the drive screw and rotate.

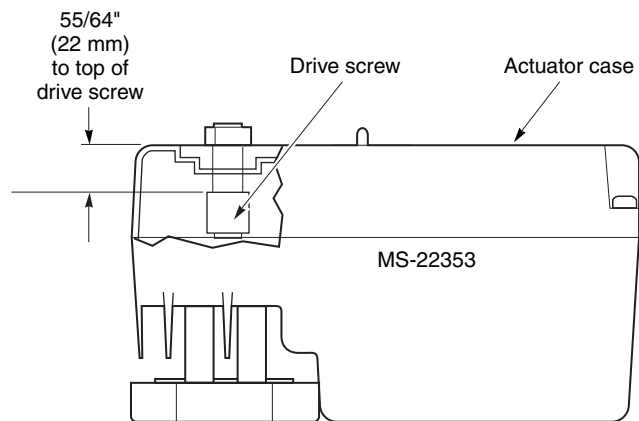


Figure-9 Position Drive Screw Before Mounting Actuator.

13. Insert the valve stem extension through the bottom of the actuator. If necessary, rotate the drive screw slightly to align the hex in the drive screw to the square in the lower bearing to match the stem extension hex and square.
14. Screw the valve mounting nut into the actuator and tighten.

---

**Caution:** The hex shaped interface between the stem extension and drive screw does not require high indicator nut tightening torque. Do not tighten the indicator nut beyond the hex shoulder on the stem extension or a reduction in the actuator output may result. See Figure-10 for parts identification.

---

15. Insert the position indicator nut into the hole at the top of the actuator. Screw it onto the stem extension and tighten it against the shoulder on the stem extension.
16. Reconnect power to the actuator.



## AV-644 Valve Assembly

1. Position the valve stem in the down position. Place the locknut onto the valve stem.
2. Remove the stem extension from the actuator. Unscrew the position indicator nut on the top of the actuator and remove it. Refer to Figure-10 for part identification.

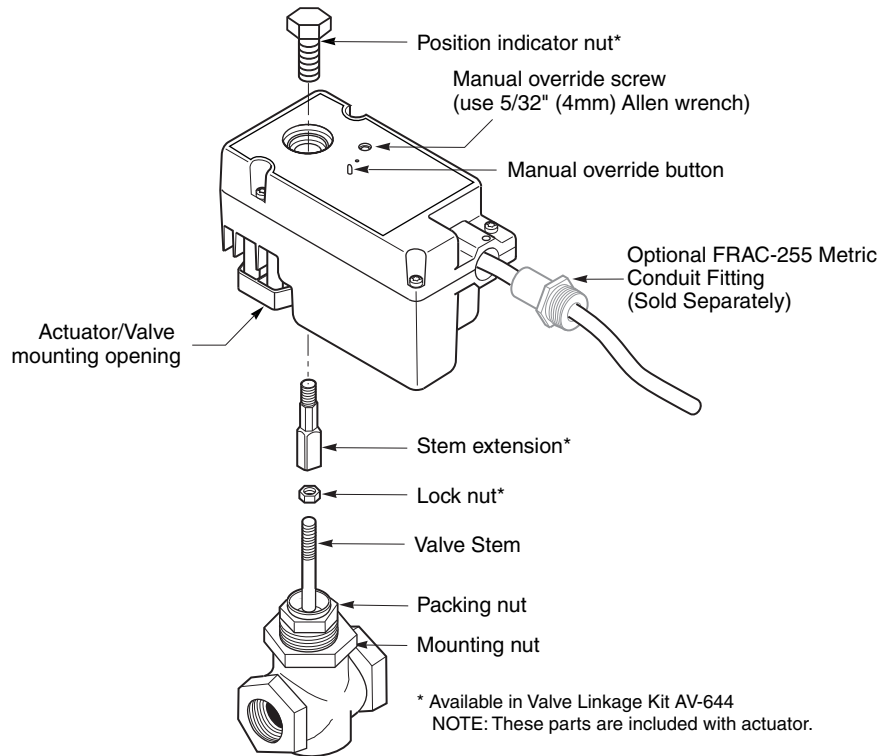


Figure-10 MF-2xxx3 Series and MS-22353 Actuator Assembly Diagram.

3. Screw the locknut and stem extension onto the valve stem. Adjust the stem extension of the selected actuator to the height specified for that model, see Figure-11. This dimension is the distance from the top of the packing nut to be shoulder of the stem extension.

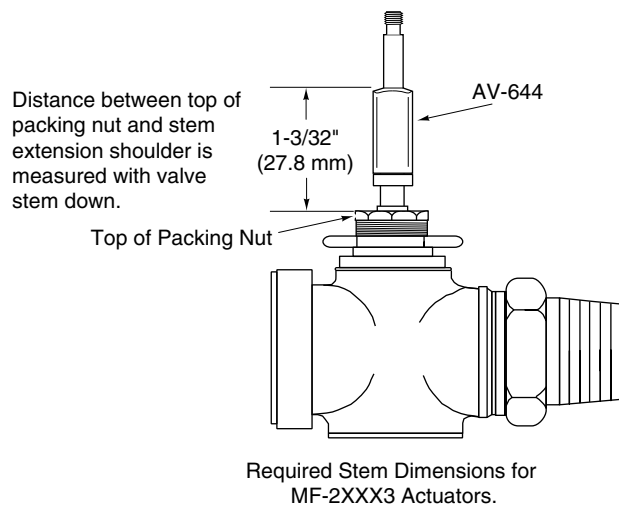


Figure-11 Valve and Stem Extension Assembly.

4. Tighten the locknut against the stem extension to make the stem extension secure to the valve stem.
5. Position the valve stem so it is seated in the down position.

- Confirm that the drive screw for the actuator model being mounted is the required distance from the top of the actuator case. See Figure-12. If the drive screw is not in position, insert a tapered pencil or pen into the drive screw and rotate.

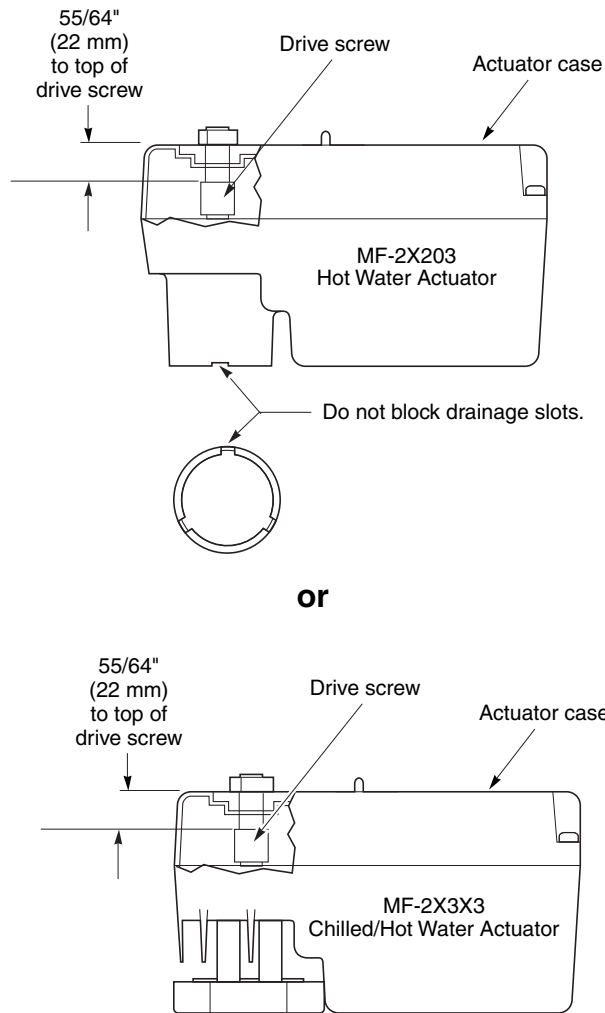


Figure-12 Position Drive Screw Before Mounting Actuator.

- Insert the valve stem extension through the bottom of the actuator. Rotate the actuator slightly until the stem extension slides through the actuator, and then rotate to the desired position for wiring.

---

*Note:* If necessary rotate the drive screw slightly to align the hex in the drive screw to the square in the bearing to match the stem extension.

---

- Screw the valve mounting nut into the actuator and tighten.
- Position the indicator nut on top on the actuator.
- Tighten the indicator nut against the shoulder of the hex on the stem extension.

---

**Caution:** The hex shaped interface between the stem extension and drive screw does not require high indicator nut tightening torque. Do not tighten the indicator nut beyond the hex shoulder on the stem extension or a reduction in the actuator output may result. See Figure-10 for parts identification.

---

- Reconnect power to the actuator.

## Re-establishing Potentiometer Position

If an actuator is run or adjusted without being mounted to a valve, the actuator position can be re-established. Refer to Table-2 and Figure-10.

1. Remove actuator position indicator nut. Unscrew mounting nut and remove actuator from valve.
2. Apply a fixed DC voltage (30V maximum) across the potentiometer with positive voltage applied to extend [Brown] and 0 volts to retract [Orange].
3. Depress the manual override button and turn the manual override screw so that the potentiometer output is 91.5%. For example, with 10V applied across the potentiometer adjust the actuator so the potentiometer output is 9.15V from wiper [Blue] to retract [Orange]. Now follow the assembly steps for the appropriate valve linkage.

**Table-2 Power and Control Wiring Color Codes.**

	Actuator Label	Description	Wire Codes	
			Color Only (Current Models)	Color with Numbers (Older Models) <sup>a</sup>
<b>Actuator Power</b>	Earth	Earth Ground	Green	Green (—)
	24 H	24 Vac	Black	Black (1)
	24 G	24 Vac	Red	Red <sup>b</sup> (2)
<b>Proportional Control Signals</b>	+VDC (IN)	2 to 10 Vdc Input	White	White/Green (3)
	-COMMON	DC Common Ground	Orange	White/Orange (4)
	+mADC (IN)	4 to 20 mADC Input	Brown	White/Brown (6)
<b>Feedback Control Signal</b>	+VFB	Actuator Feedback	Blue	White/Blue (5)

<sup>a</sup> Actuator models manufactured prior to date code 991x (e.g. 9910, 9911, etc.) have multi-color, numbered wires.

<sup>b</sup> Actuator power wire may be Violet on some models.

On October 1st, 2009, TAC became the Buildings business of its parent company Schneider Electric. This document reflects the visual identity of Schneider Electric, however there remains references to TAC as a corporate brand in the body copy. As each document is updated, the body copy will be changed to reflect appropriate corporate brand changes.

---

Copyright 2010, Schneider Electric  
All brand names, trademarks and registered  
trademarks are the property of their respective  
owners. Information contained within this  
document is subject to change without notice.

**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)

