



# General Instructions

## AV-650 Gear Train Actuator Linkage

### APPLICATION

This General Instruction sheet provides the information necessary to field assemble AV-650 gear train actuator linkage to Honeywell V-5011 two-way and V-5013 three-way (1/2 to 3") valve bodies, with a 1-3/8" bonnet.

### SPECIFICATIONS

**Minimum Actuator Torque Required:** 50 lb.-in. (5.6 N-m).  
Actuator must have 180° stroke.

**Stem Force:** 150 lb. (667 N).

**Close-Off Pressure Ratings for Valves Using Electric Gear Train Actuators:** See Table 1.

**TABLE 1. CLOSE-OFF PRESSURE RATINGS**

Valve Body		Close-Off Pressure Ratings psi (kPa)*
V-5011	1/2"	150 (1034)
	3/4"	150 (1034)
	1"	150 (1034)
	1-1/4"	132 (910)
	1-1/2"	85 (586)
	2"	52 (359)
	2-1/2"	30 (207)
	3"	19 (131)
V-5013	1/2"	150 (1034)
	3/4"	150 (1034)
	1"	150 (1034)
	1-1/4"	137 (945)
	1-1/2"	92 (634)
	2"	63 (434)
	2-1/2"	30 (207)
	3"	21 (145)

\*Based on 150 lb. (668 N) stem force.

**OPTIONS** None

**ACCESSORIES** None

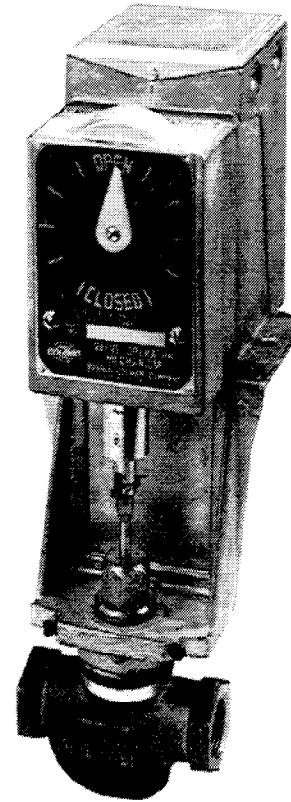
### PRE-INSTALLATION

#### Inspection

Visually inspect the carton for damage. If damaged, notify the appropriate carrier immediately. If undamaged, open the carton and visually inspect the device for obvious defects. Return damaged or defective products.

#### Required Installation Items

- AV-650 linkage
- Actuator
- Valve body
- Tools:
  - Allen wrench
  - Crescent wrench
  - Screwdriver



**Typical Assembly**

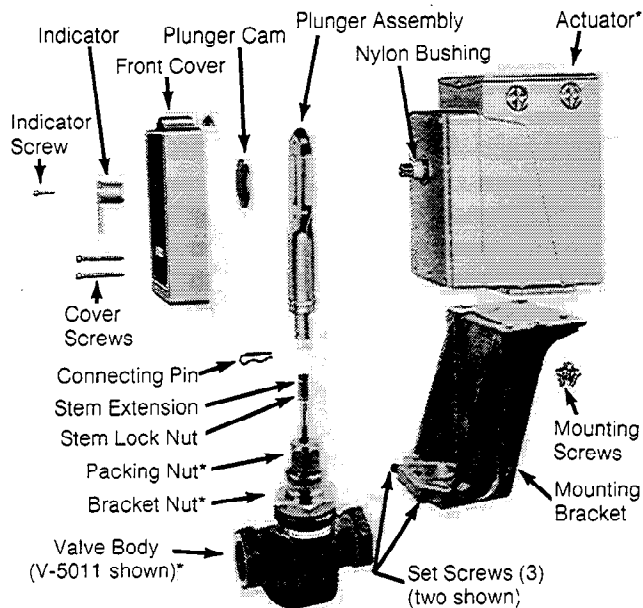
### INSTALLATION

#### CAUTION

1. Installer must be a qualified, experienced technician.
2. Install all globe-type valves with pressure under seat. An arrow on the valve body indicates the proper flow direction.
3. Always install three-way mixing valves with two inlets and one outlet.
4. Always install three-way diverting valves with one inlet and two outlets.

#### Assembly of Mounting Bracket to Valve Body (See Figure 1)

1. Place mounting bracket on valve body.
2. Tighten the three set screws in the base of the mounting bracket.



\*Not included in the AV-650 kit.

**Figure 1. Valve Actuator Linkage AV-650 for Honeywell Valve Bodies V-5011 & V-5013 (1/2 thru 3"), with a 1-3/8" Bonnet**

**Assembly of Stem Extension on Valve Stem & Actuator on Mounting Bracket (See Figure 1)**

1. Thread stem lock nut and stem extension down fully on valve stem.
2. Place actuator on mounting bracket. Fasten actuator to mounting bracket with three 1/4-20 screws provided.

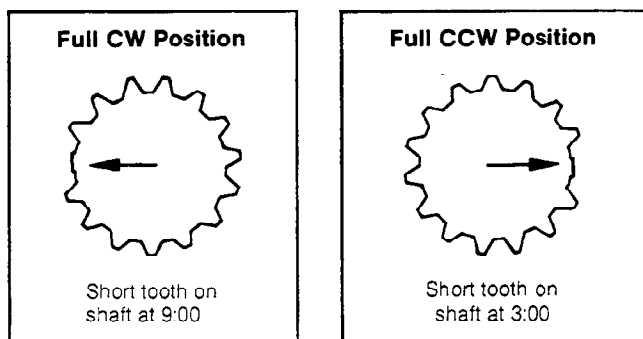
**CAUTION**

Do not tighten mounting screws.

3. Place nylon bushing on actuator shaft.

**Cam Positioning for Control System Application**

1. Determine actuator shaft position from Figure 2 (no power to actuator). If actuator shaft position (indicated by short tooth) is not in the 9:00 or 3:00 position, power the actuator until this is the case. The actuator shaft of spring return and MC actuator will be in the 9:00 or 3:00 position with no power to the actuator.



**Figure 2. Actuator Shaft Position (Front View)**

2. Determine the cam position on the actuator shaft by referring to Figure 2 and Table 2 and considering the application. Actuators are normally shipped from the factory for direct acting heating applications. A call for heat will cause the valve to open. On system checkout or field assembly, the applications may vary.

**TABLE 2. CAM POSITION ON ACTUATOR SHAFT**

Actuator Shaft Position	Std. Factory Positions of Cam except for Normally Closed Valves w/MA-3XX, 4XX Actuators	Optional 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		
<b>CCW</b> Short tooth on actuator shaft at 3:00		

3. Place the cam in plunger and slip on the actuator shaft.

**Assuring Proper Close-Off of Valve**

**For normally open two-way valve assemblies, spring return actuators:**

1. With actuator in its spring return position, the cam should be pointing up (refer to Figure 2 and Table 2).
2. Power actuator so that cam is now pointing down.
3. With valve stem down, screw stem extension into plunger until holes in stem extension and plunger line up.
4. Turn stem extension up two full turns.
5. Raise actuator until connecting pin can be inserted through plunger and stem extension holes.
6. Tighten actuator mounting screws.
7. Tighten lock nut against stem extension.

**For normally closed two-way valve assemblies, spring return actuators:**

1. With actuator in its spring return position, the cam should be pointing down (refer to Figure 2 and Table 2).
2. With valve stem down, screw stem extension into plunger until holes in stem extension and plunger line up.
3. Turn stem extension up two full turns.
4. Raise actuator until connecting pin can be inserted through plunger and stem extension holes.
5. Tighten actuator mounting screws.
6. Tighten lock nut against stem extension.

**For two-way valve assemblies, non-spring return actuators:**

1. Cam should be pointing down (refer to Figure 2 and Table 2); if not, power actuator until holes and stem extension and plunger line up.
2. With valve stem down, screw stem extension into plunger until holes in stem extension and plunger line up.
3. Turn stem extension up two full turns.
4. Raise actuator until connecting pin can be inserted through plunger and stem extension holes.
5. Tighten actuator mounting screws.
6. Tighten lock nut against stem extension.

**For three-way valve assemblies:**

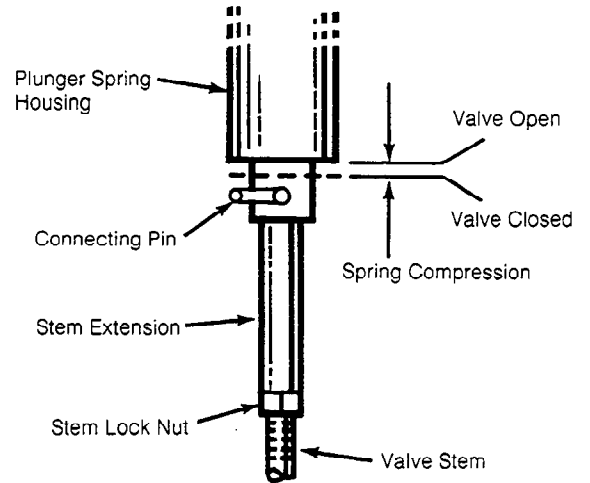
1. Cam should be pointing up (refer to Figure 2 and Table 2); if not, power actuator until cam is in this position.
2. With valve stem up, screw stem extension into plunger until holes in stem extension and plunger line up.
3. Turn stem extension down 1-1/2 turns.
4. Power actuator (or lower actuator plunger by tipping actuator forward) until connecting pin can be inserted through plunger and stem extension holes.
5. Tighten actuator mounting screws.
6. Check compression per note below. If compression is insufficient, stem extension should be adjusted an additional 1/2 turn down.
7. Tighten lock nut against stem extension.

**To Complete Assembly**

1. Place front cover over plunger assembly and fasten to actuator with two self-tapping screws.
2. Install position indicator to end of actuator shaft to correspond with point of cam position and secure with screw.

**NOTE: Compression Check**

Check plunger spring compression (Figure 3). The length of stem should be adjusted so valve disc seats before actuator reaches the end of closing stroke. Balance of actuator travel is taken up in plunger spring compression and should be approximately 1/16" (1.6 mm). This provides pressure on disc in closed position and also compensates for disc and seat wear. On three-way valves spring compression must be provided on both upper and lower seats.



**Figure 3. Plunger Spring Compression**

**MAINTENANCE**

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

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