BARBER COLMAN COMPANY
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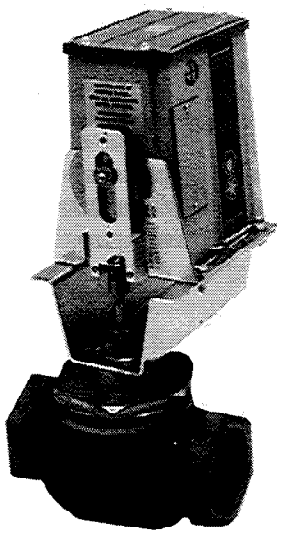
General Instructions

AV-631 Valve Linkage For Use With MM/MMR-400 & MM/MMR-500 Series Motors & Honeywell Valves

APPLICATION

The AV-631 is used to link any MM/MMR-400 non spring return or MM/MMR-500 spring return motors to specific Honeywell valve bodies.



Each AV-631 package contains:

One (1)	Mounting bracket
One (1)	Mounting plate
One (1)	Plunger
One (1)	13/16" Link rod
One (1)	Stem extension for 1/4" dia. stem end
One (1)	Stem extension locknut for 1/4" dia. stem end
Two (2)	Plunger cams(marked 190-50 and 190-70)
One (1)	Motor output shaft spacer
One (1)	Adapter ring
Two (2)	Allen head set screws for adapter ring
Two (2)	Spring pins
One (1)	Plunger retaining spacer
One (1)	#8 X 1/2" Allen head Nylock plunger retaining spacer screw
Two (2)	Adapter ring and mounting bracket fillister screws
Four (4)	1/4"-20 X 7/8" long hexhead motor mounting bolts
Four (4)	Nuts for 1/4"-20 X 7/8" long hexhead motor mounting bolts
Four (4)	Washers for 1/4"-20 X 7/8" long hexhead motor mounting bolts
One (1	OPEN/CLOSED label for 3/4" lift
One (1)	General Instructions sheet

Other Barber-Colman Components Required:
MM or MMR Modular Motor, MMC Control Module and other required accessories.

Other Barber-Colman Components That May Be Required:

One (1)	AM-237 Bracket required to mount Honeywell Q607 and Q181 shaft mounted auxiliary devices.

PRE-INSTALLATION

Inspection

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

Required Installation Items

Tools (not supplied)

One(1)	Heavy-duty screwdriver
One(1)	Standard screwdriver
Two(2)	Crescent wrenches, large and small
One(1)	Optional, vice is desirable to aid the assembly of 1/2 to 2" valve bodies (make certain the vice jaws are placed on the end fitting of the valve body or damage may result -voiding the valve body warranty).
One (1)	Allen head wrench set

INSTALLATION

CAUTION

1. Installer must be a qualified, experienced technician.
2. MM-400/500 Series and MMR-400-500 Series General Instruction sheets contain specific information on modular motor installation.
3. Avoid locations where excessive moisture, corrosive fumes or vibrations are present.
4. AV-631 linkages are intended for mounting only the MM-400/500 Series and MMR-400/500 Series motors to Honeywell valve bodies (See Table 1 for specific valve part numbers).

TO REMOVE HONEYWELL MOTORS LINKAGES & AUXILIARY DEVICES

Table 1. Barber-Colman Motors Compatible with AV-631 & Resulting Close-Off Pressures

VALVE SIZE	HONEYWELL VALVE BODY PART NUMBER	LINK ROD PART NUMBER	STEM EXT. PART NUMBER	MMR-500 SPRING RETURN CAM PART NUMBER	MMR-500 SPRING RETURN CLOSE OFF PRESSURE (PSI)	MMR-400 NON SPR. RET. CAM PART NUMBER	MMR-400 NON SPR. RET. CLOSE OFF PRESSURE (PSI)
HONEYWELL 2-WAY VALVES							
1/2"	V5011A1015	BDHE-127-10	BDHE-117	BDHE-190-50 (Marked 190-50)	150	BDHE-190-70 (Marked 190-70)	150
	V5011A1049						
	V5011A1072						
	V5011A1106						
	V5011C1045						
	V5011C1060						
	V5011C1086						
	V5011C1524						
	V5011C1532						
	V5011C1540						
	V5011C1557						
	V5011C1565						
3/4"	V5011A1163				122		
	V5011C1144						
	V5011C1151						
	V5011C1599						
1"	V5011A1221				96		
	V5011C1201						
	V5011C1219						
	V5011C1623						
1-1/4"	V5011A1288				60		141
	V5011C1268						
	V5011C1656						
1-1/2"	V5011A1346				39		91
	V5011C1326						
	V5011C1334						
	V5011C1680						
2"	V5011A1395				22		55
	V5011A1403						
	V5011C1383						
	V5011C1391						
2-1/2"	V5011A1460				12		32
	V5011A1734						
	V5011C1441						
	V5011C1458						
3"	V5011A1528				8		20
	V5011A1767						
	V5011C1516						
HONEYWELL 3-WAY VALVES - MIXING							
1/2"	V5013A1005	BDHE-127-10	BDHE-117	BDHE-190-50 (Marked 190-50)	130	BDHE-190-70 (Marked 190-70)	150
	V5013A1013						
3/4"	V5013A1021				120		
1"	V5013A1039				70		
1-1/4"	V5013A1047				50		146
1-1/2"	V5013A1054				35		98
2"	V5013A1062				20		67
2-1/2"	V5013B1003			NOT AVAILABLE			32
3"	V5013B1011						22
HONEYWELL 3-WAY VALVES - DIVERTING							
2-1/2"	V90CA-7	BDHE-127-10	BDHE-117	NOT AVAILABLE		BDHE-190-70 (Marked 190-70)	32
3"	V90CA-8						22

REMOVING AND REINSTALLATION OF HONEYWELL Q181A AUXILIARY POTENTIOMETER AND Q607 AUXILIARY SWITCH KIT FROM HONEYWELL MOTOR, SEE GENERAL INSTRUCTIONS FOR AM-237 (F-23503)

REMOVING HONEYWELL MOTOR AND Q601E LINKAGE ON 2-WAY AND 3-WAY GLOBE VALVES.

The following step by step instructions to remove Honeywell Modutrol Series motors and Q601E linkage on 2-Way and 3-Way Globe Valves (See Figure 1):

1. Disconnect power.
2. Remove top cover of motor.
3. Label leads by terminal designation (Eg. R, W, B, TR1,TR2 etc.) and remove wiring from Motor. Be sure and also label wires for auxiliary switches or devices.
4. Remove any auxiliary equipment attached to the auxiliary end or motor housing.
5. Remove conduit connection.
6. Remove linkage cover.
7. Remove spring adjust locknut to relieve tension on the spring.
8. Remove the stem button clamp screw.
9. Push the stem button clamp screw away from the stem button.
10. Loosen the two (2) setscrews in the base of the mounting bracket with a 5/32 Allen Wrench and lift the linkage and motor assembly from the valve bonnet.
11. Remove the button connector from the valve stem.

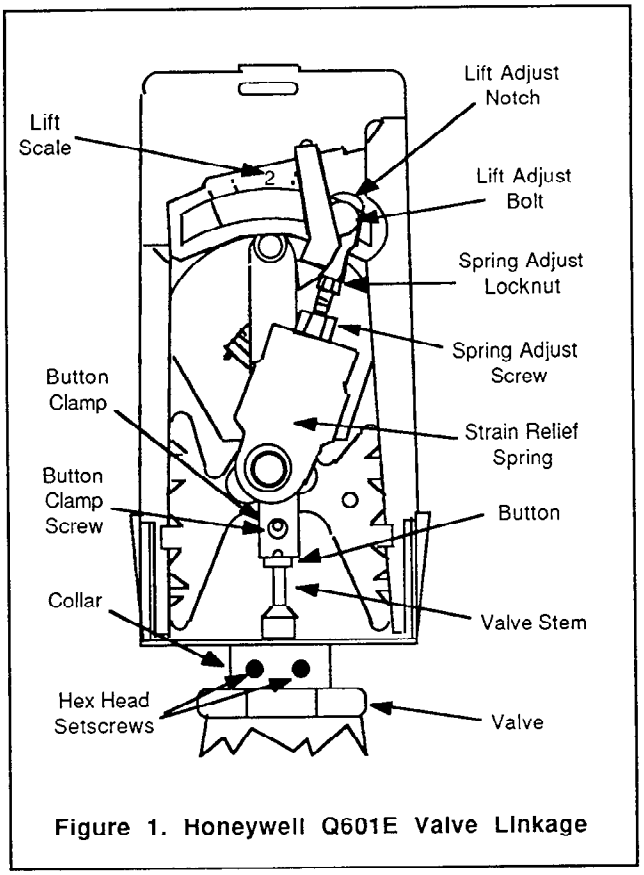


Figure 1. Honeywell Q601E Valve Linkage

REMOVING HONEYWELL MOTOR AND Q618A LINKAGE ON 2-WAY AND 3-WAY GLOBE VALVES.

The following step by step instructions to remove Honeywell Modutrol Series motors and Q618A linkage on 2-Way and 3-Way Globe Valves (See Figures 2 & 3):

1. Disconnect power.
2. Remove top cover of motor.
3. Label leads by terminal designation (Eg. R, W, B, TR1,TR2 etc.) and remove wiring from Motor. Be sure and also label wires for auxiliary switches or devices.
4. Remove any auxiliary equipment attached to the auxiliary end or motor housing.
5. Remove conduit connection.
6. Remove linkage cover.
7. Remove Stem Button Clamp screw.

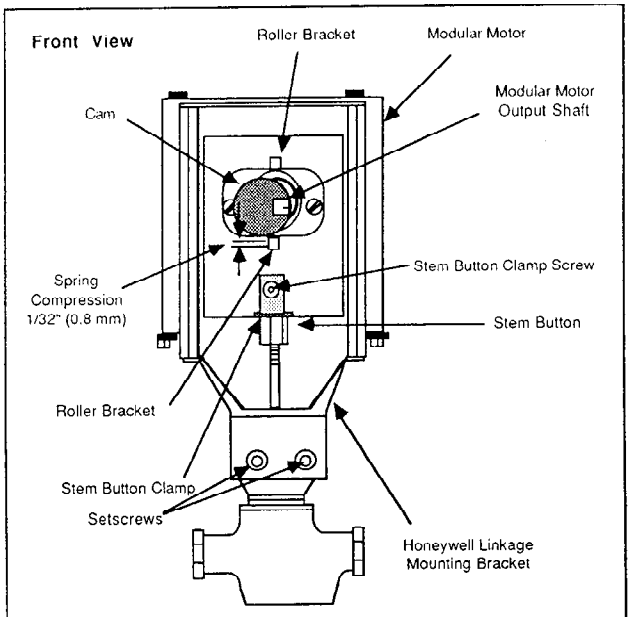


Figure 2. Honeywell Q618A Valve Linkage
(Shown with Cover Removed)

8. Remove Stem Button Clamp.

NOTE

On Spring Return motors insert heavy duty screwdriver at the top or bottom of the linkage slide in the back slot of linkage frame. Pry the linkage slide upward or downward to free Stem Button Clamp (See Figure 3).

9. Loosen the two (2) setscrews in the base of the mounting bracket with a 5/32 Allen Wrench and lift the linkage and motor assembly from the valve bonnet.

10. Remove the button connector from the valve stem.

TO MOUNT BARBER COLMAN MODULAR MOTOR TO HONEYWELL VALVES

To mount 2-Way Normally Closed (stem up to open bodies) & 3-Way Mixing bodies assembled to the "Normally Closed CCW" end of MM/MMR-500 Series Spring Return Motors (See Table 1 & Figures 4 & 5):

1. Select the appropriate modular motor, plug-in control module and accessories.

2. Select "Normally Closed-CCW" end of the motor when installing to a N.C. Honeywell valve.

3. Place the adapter ring over the bonnet of the valve body. Secure the adapter ring to the valve body by threading (using a 9/64" Allen wrench) the two (2) Allen head screws supplied.

CAUTION

Make certain the Allen head screws secure the adapter ring to the valve body. Failure to do so, may cause the valve linkage assembly to detach from the valve body.

4. Place the mounting bracket on the adapter ring and secure the adapter ring to the mounting bracket with the two (2) 1/2" long fillister head screws supplied.

5. Place the mounting plate on the mounting bracket.

NOTE

Make certain that the holes on the mounting bracket and mounting plate line up.

6. Place the output shaft spacer over the end of the motor output shaft.

NOTE

The greater inside diameter of the spacer must rest against the retaining clip of the motor output shaft.

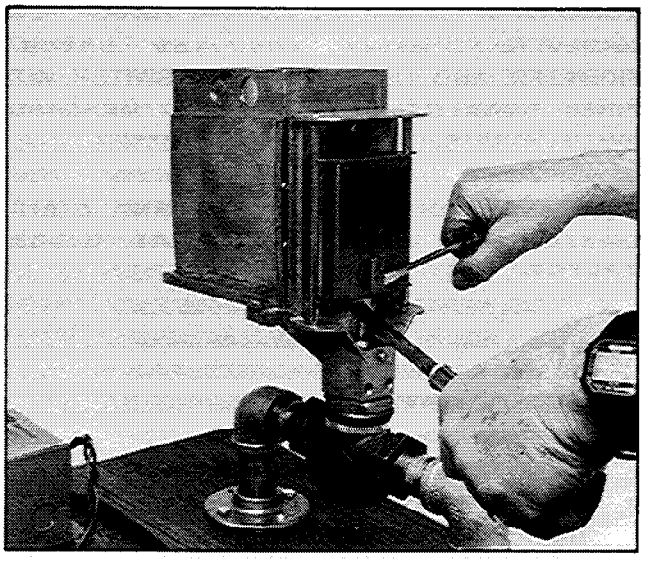


Figure 3. Removal of Stem Button Clamp from Q618A Valve Linkage.

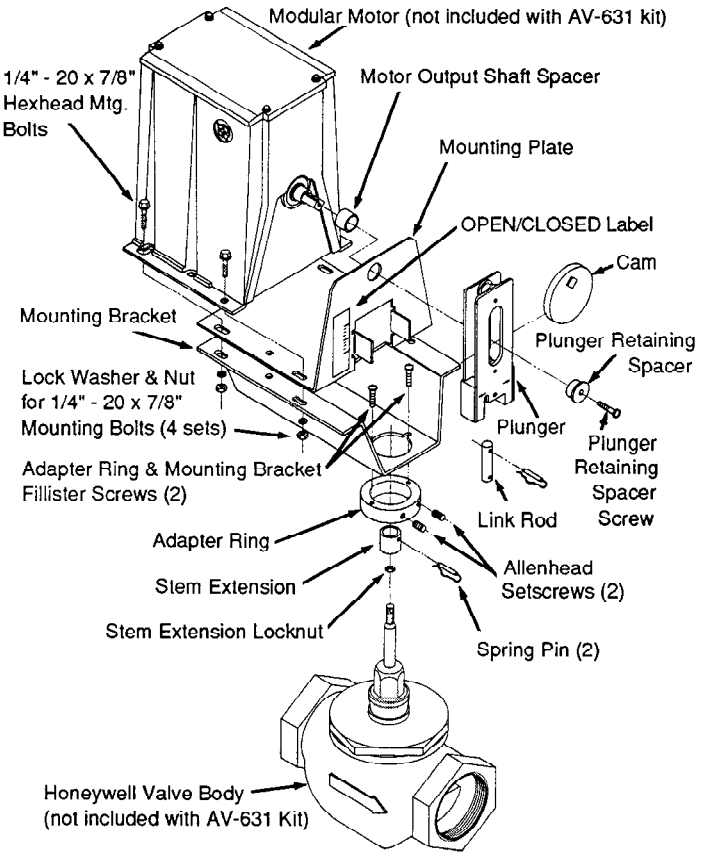


Figure 4. Valves Assembled to the "Normally Closed-CCW" End of MM/MMR-500 Series Spring Return Motors.

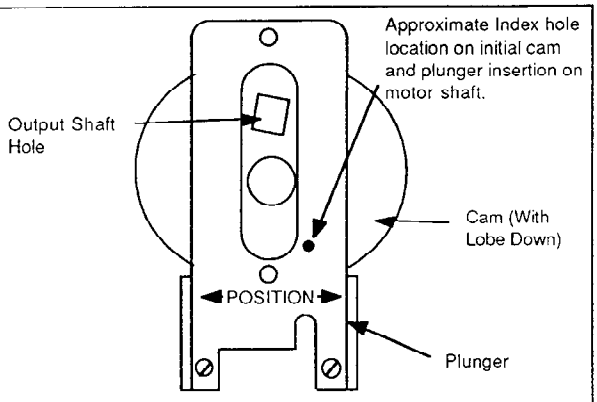


Figure 5. Initial Cam Installation Position For Valves Assembled To The "Normally Closed-CWW" End Of MM/MMR-500 Spring Return Motors.

7. Place the modular motor on the mounting plate with the "Normally Closed-CCW" end of the motor output shaft through the hole in the mounting plate.The front holes of the motor mounting base must line up with the front slotted holes of the mounting bracket and mounting plate.

NOTE

Make certain the mounting bracket and mounting plate hole alignment has not changed.

8. Insert four (4) hexhead 1/4"-20 X 7/8" mounting bolts into the mounting base of the motor and mounting bracket/plate assembly. Secure the motor to the mounting bracket/plate assembly with bolts, washers and nuts.

9. With the valve stem pushed completely down, thread the locknut, for 1/4" dia. stem ends, completely onto the valve stem.

10. Thread the stem extension for 1/4" dia. stem ends completely onto the valve stem.

11. Insert the stem extension link rod into the base of the plunger and secure with a spring pin.

NOTE

Make certain the spring pin goes through both sides of the plunger.

12. Select the cam marked 190-50.

13. With the word "POSITION" marked on the bottom of the plunger facing the installer, insert the 190-50 cam into the plunger **with the cam part number facing the installer**. The cam square shaft hole must be located on the top of the plunger slot and the index hole located as shown in Figure 5.

NOTE

The cam edge must fit in the grooved edges of the plunger rollers.

14. Slide the cam and plunger assembly over the motor output shaft until the plunger rests against the mounting plate.

NOTE

It will be necessary to place the stem extension link rod into the stem extension before sliding the cam onto the motor output shaft.

15. Push the plunger retaining spacer onto the motor output shaft and secure with the 9/16" long retaining screw with integral washer.

16. Stem extension adjustment:

    a. Turn the stem extension CCW (as viewed from above) until it becomes snug against the stem extension link rod.

    b. Wire power and control signal to the modular motor.

    c. Run the motor CW approximately 50% of travel.

    d. Turn the stem extension two (2) turns CCW (as viewed from above) until the connecting pin hole faces the installer.

    e. Pull the valve stem up until the connecting pin holes in the stem extension link rod and stem extension line up.

    f. Insert spring pin all the way through the stem extension and stem extension link rod holes.

17. Run the motor fully CW until the motor stops.

18. Run the motor fully CCW until the motor stops.

NOTE

The index hole on the plunger cam will not normally return to its original position (when installed on the motor output shaft) -this will assure proper close-off.force on the valve stem. If sufficient close-off is not obtained, repeat steps 16 through 18 above - except for 16 - d turn stem extension an extra full turn CCW to provide additional compression. If sufficient close-off is still not obtained, check the valve stem and plug assembly for excessive wear - replace the stem and plug components if required.

19. Tighten the stem extension lock nut against the stem extension.

20. Place the OPEN/CLOSED label on the mounting plate with the CLOSED mark next to the "POSITION" arrow on the plunger (OPEN marking away from the valve body) with the motor in the fully CCW position.

21. Replace top cover on motor.

22. Checkout:

    a. Motor should run freely through complete stroke.

    b. Linkage should operate without binding.

    c. Valve must close off tightly at bottom of stroke (both ends of stroke on 3-Way application).

23. Linkage assembly is complete.

To Mount 2-Way Normally Open (stem up to open bodies) & 3-Way Mixing bodies assembled to the "Normally Open-CW" End of the MM/MMR-500 Series Spring Return Motors (See Table 1 & Figures 6 & 7):

1. Select the appropriate modular motor, plug-in module and accessories.

2. Select "Normally Open-CW" end of the motor when installing to a N.O. Honeywell valve.

3. Place the adapter ring over the bonnet of the valve body. Secure the adapter ring to the valve body by threading (using a 9/64" Allen wrench) the two (2) Allen head screws supplied.

CAUTION

Make certain the Allen head screws secure the adapter ring to the valve body. Failure to do so, may cause the valve linkage assembly to detach from the valve body.

4. Place the mounting bracket on the adapter ring and secure the adapter ring to the mounting bracket with the two (2) 1/2" long fillister head screws supplied.

5. Place the mounting plate on the mounting bracket.

NOTE

Make certain that the holes on the mounting bracket and mounting plate line-up.

6. Place the output shaft spacer over the end of the motor output shaft.

NOTE

The greater inside diameter of the spacer must rest against the retaining clip of the motor output shaft.

7. Place the modular motor on the mounting plate with the "Normally Open-CW" end of the motor output shaft through the hole in the mounting plate.The front slotted holes of the motor mounting plate must line up with the back end of the front slots of the mounting plate and mounting bracket.

NOTE

Make certain the mounting bracket and mounting plate hole alignment has not changed.

8. Insert four (4) hexhead 1/4"-20 X 7/8" mounting bolts into the mounting base of the motor and mounting bracket/plate assembly. Secure the motor to the mounting bracket/plate assembly with bolts, washers and nuts.

9. With the valve stem pushed completely down, thread the locknut, for 1/4" dia. stem ends, completely onto the valve stem.

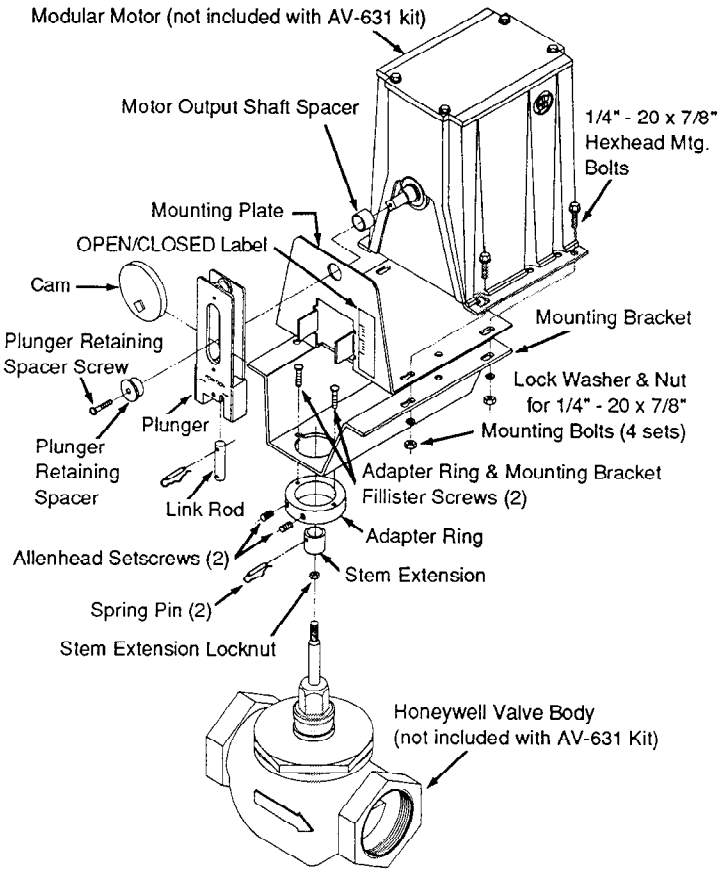


Figure 6. Valves Assembled To The "Normally Open-CW" End Of MM/MMR-500 Series Spring Return Motors.

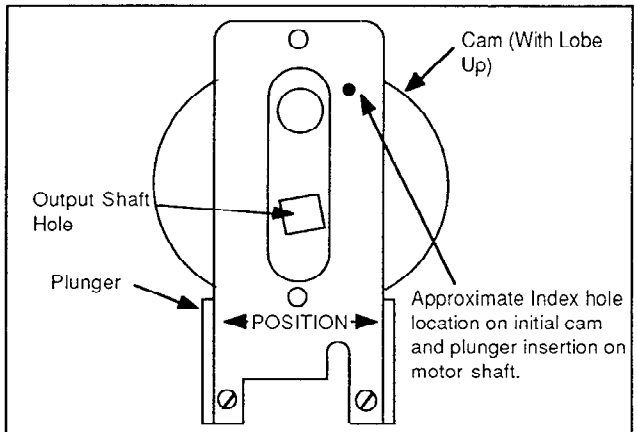


Figure 7. Initial Cam Installation Position for Valves Assembled to the "Normally Open-CW' End of MM/MMR-500 Series Spring Return Motors.

10. Thread the stem extension for 1/4" dia. stem ends completely onto the valve stem.

11. Insert the stem extension link rod into the base of the plunger and secure with a spring pin.

NOTE

Make certain the spring pin goes through both sides of the plunger.

12. Select the cam marked 190-50.

13. With the word "POSITION" on the bottom of the plunger facing the installer, insert the 190-50 cam into the plunger **with the cam part number facing the motor**. The cam square shaft hole must be located on the bottom of the plunger slot and the index hole located as shown in Figure 7.

NOTE

The cam edge must fit in the grooved edges of the plunger rollers.

14. Slide the cam and plunger combination over the motor output shaft until the plunger rests against the mounting bracket.

15. Push the plunger retaining spacer onto the motor output shaft and secure with the 9/16" long retaining screw with integral washer.

16. Stem extension adjustment:

    a. Wire power and control signal to the modular motor.

    b. Run the motor CCW to end of travel.

    c. Turn the stem extension CCW (as viewed from above) until it becomes snug against the stem extension link rod.

    d. Drive the motor CW approximately 50% of travel.

    e. Turn the stem extension two (2) turns CCW (as viewed from above) until the connecting pin hole faces the installer.

    f. Pull the valve stem up until the connecting pin holes in the stem extension link rod and stem extension line up.

    g. Insert spring pin into the stem extension and stem extension link rod .

17. Run the motor fully CW until the motor stops.

18. Run the motor fully CCW until the motor stops.

NOTE

The index hole on the plunger cam will not normally return to its original position (when installed on the motor output shaft) -this will assure proper close-off.force on the valve stem. If sufficient close-off is not obtained, repeat steps 16 through 18 above - except for 16 - e turn stem extension an extra full turn CCW to provide additional compression. If sufficient close-off is still not obtained, check the valve stem and plug assembly for excessive wear - replace the stem and plug components if required.

19. Tighten the stem extension lock nut against the stem extension.

20. Place the OPEN/CLOSED label on the mounting plate with the OPEN mark next to the "POSITION" arrow on the plunger (CLOSED marking toward valve body) with the motor in the fully CW position.

21. Replace top cover on motor.

22. Checkout:

    a. Motor should run freely through complete stroke.

    b. Linkage should operate without binding.

    c. Valve must close off tightly at bottom of stroke (both ends of stroke on 3-Way application).

23. Linkage assembly is complete.

To Mount 2-Way (stem up to open bodies) & 3-Way Mixing and Diverting bodies assembled to the "Load" end of MM/MMR-400 Series Non-Spring Return Motors (See Table 1 & Figures 8 & 9):

1. Select the appropriate modular motor, plug-in module and accessories.

2. Select "Load" end of motor.

3. Place the adapter ring over the bonnet of the valve body. Secure the adapter ring to the valve body by threading (using a 9/64" Allen wrench) the two (2) Allen head screws supplied.

CAUTION

Make certain the Allen head screws secure the adapter ring to the valve body. Failure to do so, may cause the valve linkage assembly to detach from the valve body.

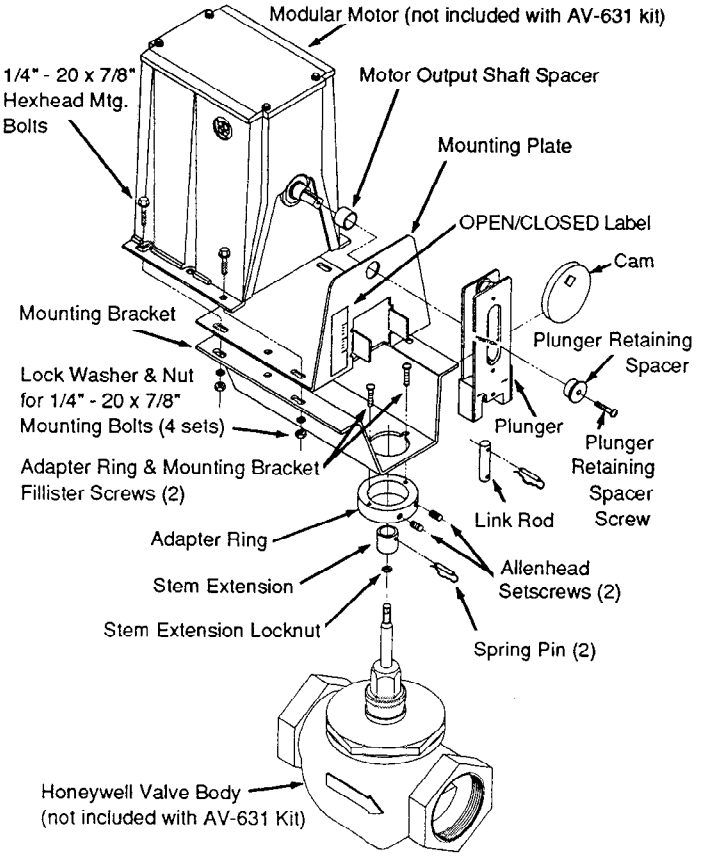


Figure 8. Valves Assembled To The "Load" End Of MM/MMR-400 Series Non-Spring Return Motors.

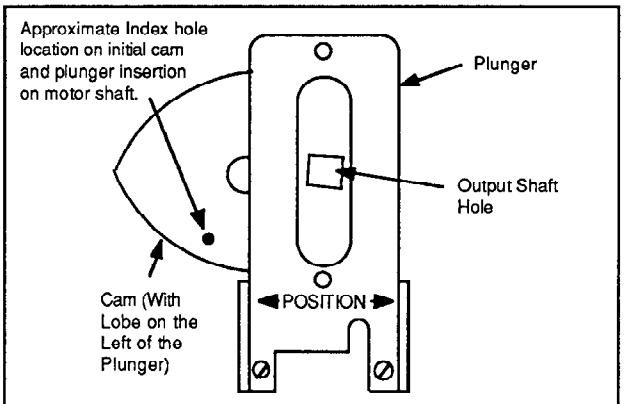


Figure 9. Initial Cam Installation Position for Valves Assembled to "Load" End of MM/MMR-400 Series Non-Spring Return Motors.

4. Place the mounting bracket on the adapter ring and secure the adapter ring to the mounting bracket with the two (2) 1/2" long fillister head screws supplied.

5. Place the mounting plate on the mounting bracket.

NOTE

Make certain that the holes on the mounting bracket and mounting plate line up.

6. Place the output shaft spacer over the end of the motor output shaft.

NOTE

The greater inside diameter of the spacer must rest against the retaining clip of the motor output shaft.

7. Place the modular motor on the mounting plate with the "Load" end of the motor output shaft through the hole in the mounting plate.The front holes of the motor mounting base must line up with the front slotted holes of the mounting bracket and mounting plate.

NOTE

Make certain the mounting bracket and mounting plate hole alignment has not changed.

8. Insert four (4) hexhead 1/4"-20 X 7/8" mounting bolts into the mounting base of the motor and mounting bracket/plate assembly. Secure the motor to the mounting bracket/plate assembly with bolts, washers and nuts.

9. With the valve stem pushed completely down, thread the locknut, for 1/4" dia. stem ends, completely onto the valve stem.

10. Thread the stem extension for 1/4" dia. stem ends completely onto the valve stem.

11. Insert the stem extension link rod into the base of the plunger and secure with a spring pin.

NOTE

Make certain the spring pin goes through both sides of the plunger.

12. Select the cam marked 190-70.

13. Wire power and control signal to the modular

14. Run the motor CW approximately 80° (50% of

15. With the word "POSITION" marked on the bottom of the plunger facing the installer, insert the 190-70 cam into the plunger with the lobe of the cam protruding from the left-hand side of the plunger **with the cam part number facing the installer**. The cam square shaft hole and index hole location must be as shown in Figure 9.

NOTE

The cam edge must fit in the grooved edges of the plunger rollers.

16. Slide the cam and plunger assembly over the motor output shaft until the plunger rests against the mounting plate.

17. Push the plunger retaining spacer onto the motor output shaft and secure with the 9/16" long retaining screw with integral washer.

18. Stem extension adjustment:

    a. Turn the stem extension CCW (as viewed from above) until the connecting pin holes face the installer.

    b. Pull the valve stem up until the connecting pin holes in the stem extension link rod and stem extension line up.

    c. Insert spring pin all the way through the stem extension and stem extension link rod holes.

19. Run the motor fully CW until the motor stops.

20. Run the motor fully CCW until the motor stops.

NOTE

The index hole on the plunger cam will not normally return to its original position (when installed on the motor output shaft) -this will assure proper close-off.force on the valve stem.

21. Tighten the stem extension lock nut against the stem extension.

22. Place the OPEN/CLOSED label on the mounting plate with the CLOSED mark next to the "POSITION" arrow on the plunger (OPEN marking away from the valve body) with the motor in the fully CCW position.

23. Replace top cover on motor.

24. Checkout:

    a. Motor should run freely through stroke.

    b. Linkage should operate without binding.

    c. Valve must close off tightly at bottom of stroke (both ends of stroke on 3-Way application).

25. Linkage assembly is complete.

To Mount 2-Way (stem up to open bodies) & 3-Way Mixing and Diverting bodies assembled to the "Optional" End of the MM/MMR-400 Series Non-Spring Return Motors (See Table 1 & Figures 10 & 11):

1. Select the appropriate modular motor, plug-in module and accessories.

2. Select "Optional" end of motor.

3. Place the adapter ring over the bonnet of the valve body. Secure the adapter ring to the valve body by threading (using a 9/64" Allen wrench) the two (2) Allen head screws supplied.

   CAUTION

   Make certain the Allen head screws secure the adapter ring to the valve body. Failure to do so, may cause the valve linkage assembly to detach from the valve body.

4. Place the mounting bracket on the adapter ring and secure the adapter ring to the mounting bracket with the two (2) 1/2" long fillister head screws supplied.

5. Place the mounting plate on the mounting bracket.

   NOTE

   Make certain that the holes on the mounting bracket and mounting plate line up.

6. Place the output shaft spacer over the end of the motor output shaft.

   NOTE

   The greater inside diameter of the spacer must rest against the retaining clip of the motor output shaft.

7. Place the modular motor on the mounting plate with the "Optional" end of the motor output shaft through the hole in the mounting plate.The front slotted holes of the motor mounting plate must line up with the back end of the front slots of the mounting plate and mounting bracket.

   NOTE

   Make certain the mounting bracket and mounting plate hole alignment has not changed.

8. Insert four (4) hexhead 1/4"-20 X 7/8" mounting bolts into the mounting base of the motor and mounting bracket/plate assembly. Secure the motor to the mounting bracket/plate assembly with bolts, washers and nuts.

9. With the valve stem pushed completely down, thread the locknut, for 1/4" dia. stem ends, completely onto the valve stem.

10. Thread the stem extension for 1/4" dia. stem ends completely onto the valve stem.

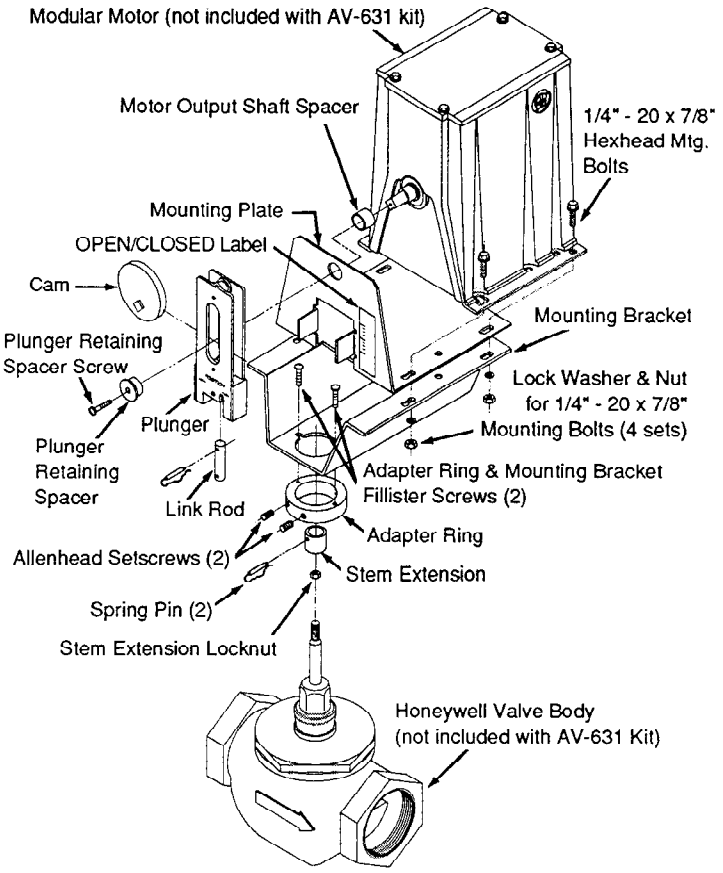


Figure 10. Valves Assembled To The "Optional" End of MM/MMR-400 Series Non-Spring Return Motors.

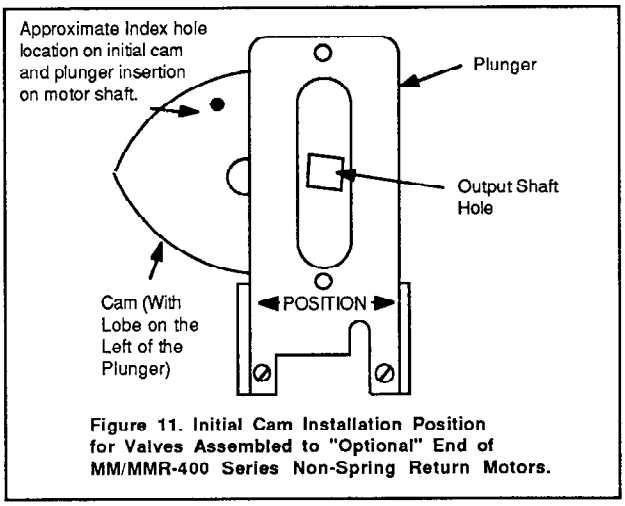


Figure 11. Initial Cam Installation Position for Valves Assembled to "Optional" End of MM/MMR-400 Series Non-Spring Return Motors.

11. Insert the stem extension link rod into the base of the plunger and secure with a spring pin.

    NOTE

    Make certain the spring pin goes through both sides of the plunger.

12. Select the cam marked 190-70.

13. Wire power and control signal to the modular motor.

14. Run the motor CCW approximately 80° (50% of travel).

15. With the word "POSITION" marked on the bottom of the plunger facing the installer, insert the 190-70 cam into the plunger with the lobe of the cam protruding from the left-hand side of the plunger **with the cam part number facing the motor.** The cam square shaft hole and index hole location must be as shown in Figure 11 .

NOTE

The cam edge must fit in the grooved edges of the plunger rollers.

16. Slide the cam and plunger assembly over the motor output shaft until the plunger rests against the mounting plate.

17. Push the plunger retaining spacer onto the motor output shaft and secure with the 9/16" long retaining screw with integral washer.

18. Stem extension adjustment:

    a. Turn the stem extension CCW (as viewed from above) until the connecting pin holes face the installer.

    b. Pull the valve stem up until the connecting pin holes in the stem extension link rod and stem extension line up.

    c. Insert spring pin all the way through the stem extension and stem extension link rod holes.

19. Run the motor fully CCW until the motor stops.

20. Run the motor fully CW until the motor stops.

NOTE

The index hole on the plunger cam will not normally return to its original position (when installed on the motor output shaft) -this will assure proper close-off.force on the valve stem.

21. Tighten the stem extension lock nut against the stem extension.

22. Place the OPEN/CLOSED label on the mounting bracket with the OPEN mark next to the "POSITION" arrow on the plunger (CLOSED marking toward valve body) with the motor in the fully CW position.

23. Replace top cover on motor.

24. Checkout:

    a. Motor should run freely through stroke.

    b. Linkage should operate without binding.

    c. Valve must close off tightly at bottom of stroke (both ends of stroke on 3-Way application).

25. Linkage assembly is complete.

MAINTENANCE

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

REPAIR

None. Replace with a functional linkage.

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