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Milwaukee's Electric Actuator  
Installation, Operation &  
Maintenance Manual

Cover screws	9/64" Allen wrench.
Terminal strip screws	1/8" wide flat head screw driver.
Cam setscrew	5/64" Allen wrench.
Mounting pad screws	3/8" socket
Cover screws	SD, Phillips head screwdriver, Deep Base, 9/64 Allen wrench, <b>NEMA 7</b> enclosure, 7/16" socket.
Position indicator	5/64" Allen wrench.
Terminal strip screws	1/8" wide flat head screw driver.
Cam setscrew	5/64" Allen wrench.
Mounting pad screws	3/8" socket.

Cover screws	5/32" Allen wrench, <b>NEMA 7</b> enclosure, 7/16" socket.
Terminal strip screws	3/16" wide flat head screw driver.
Cam setscrew	5/64" Allen wrench.
Mounting pad screws	1/2" socket.

Cover screws	7/16" socket.
Terminal strip screws	3/16" wide flat head screw driver.
Cam setscrew	5/64" Allen wrench.
Mounting pad screws	9/16" socket.

Cover screws	1/2" socket.
Position indicator	5/64" Allen wrench.
Terminal strip screws	3/16" wide flat head screw driver.
Cam setscrew	5/64" Allen wrench.
Mounting pad screws	3/4" socket.

Additional tools will be required for the screws to mount the valve to the actuator.

**SUGGESTED MAXIMUM TORQUE VALUES FOR FASTENERS in In-Lb**

Screw Size	Low Carbon Steel	18-8 SS	316 SS	Aluminum
2-56	2.2	2.5	2.6	1.4
4-40	4.7	5.2	5.5	2.9
6-32	9	10	10	5
8-32	18	20	21	10
10-24	21	23	24	13
10.32	30	32	33	19
1/4-20	65	75	79	45
5/16-18	129	132	138	80
3/8-16	212	236	247	143
1/2-13	465	517	542	313
5/8-11	1000	1110	1160	715

## **INSTALLATION:**

The actuator is shipped in the open position from the factory, it is important to make sure the valve and actuator are in the same position before mounting the actuator on the valve.

1. Manually open valve.
2. Remove valve mechanical stops. **CAUTION: DO NOT REMOVE** any parts necessary for the proper operation of the valve, i.e., packing gland, gland nut, etc.
3. Check again that the valve and actuator are in the same position.
4. Install mounting hardware on valve, do not tighten bolts securely at this time, mount actuator to valve, once actuator screws have been started securely tighten all nuts and bolts. **NOTE:** Actuator conduit entry is normally positioned perpendicular to pipe line.
5. Remove actuator cover.
6. Wire actuator using the wiring diagram inside cover. **CAUTION:** Be sure power is off at the main power box.
7. Turn on power to actuator. **CAUTION:** Use extreme caution, as there are live circuits that could cause electrical shock or death.
8. Operate the valve to the close position, check the alignment.
9. Operate the valve to the open position, check the alignment.
10. Replace cover and secure cover screws.

## **CALIBRATION:**

After checking the alignment of the valve port calibration may be required.

### **To set the open position:**

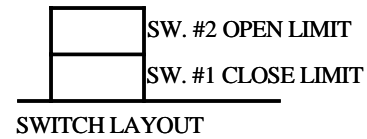
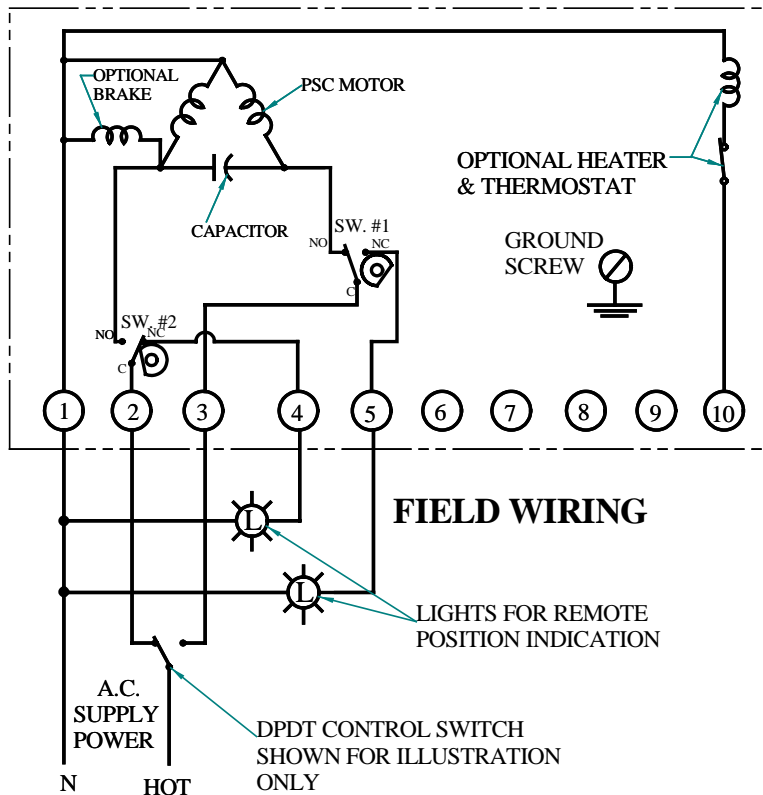
1. Operate valve to the open position by applying power to terminal connections #1 and #2, the valve will rotate counter clockwise, CCW, viewing top of actuator. **NOTE:** When the actuator is in the open position the setscrew securing the cam to the shaft will be easily accessible.
  - 1a. If valve did not open completely;
    - 1aa. Loosen 8-32 set screw in top cam.
    - 2aa. Rotate cam clockwise (CW) until the switch makes contact, listen carefully for a slight click. The valve will begin to rotate CCW, by making small incremental CW movements of the cam the valve can be positioned precisely in the desired position.
    - 3aa. Securely tighten the setscrew.
  - 1b. If valve traveled too far. **CAUTION:** Valves with mechanical stops may be damaged or cause damage to the actuator if allowed to travel too far.
    - 1bb. Apply power to terminal connections #1 and #3, the valve will begin to rotate CW, allow it to travel to the mid position.
    - 2bb. Follow directions in 1a of "To set open position".

### **To set close position:**

1. Operate valve to the close position by applying power to terminal connections #1 and #3, the valve will rotate CW viewing the top of the actuator. **NOTE:** When the actuator is in the close position the setscrew securing the close cam to the shaft will be easily accessible.
  - 1a. If valve did not close completely;
    - 1aa. Loosen 8-32 set screw in bottom cam.
    - 2aa. Rotate cam CCW until the switch makes contact, listen for a slight click. The valve will begin to rotate CW, by making small CCW incremental movements of the cam the valve can be positioned precisely in the close position.
    - 3aa. Securely tighten the setscrew.

### **To set close position, continued:**

- 1b. If the valve has traveled too far closed. **CAUTION:** Valves with mechanical stops may be damaged or cause damage to the actuator if allowed to travel too far closed.
- 1bb. Apply power to terminal connection #1 and #2, the valve will begin to rotate CCW, allow to rotate to the mid position.
- 2bb. Follow directions in 1a. of “To set close position”.



NOTES:  
 POWER TO TERMINALS ONE & TWO OPENS THE VALVE (CCW ROTATION)  
 POWER TO TERMINALS ONE & THREE CLOSSES THE VALVE (CW ROTATION)  
 TERMINALS 4 & 5 ARE FOR LIGHT INDICATION  
 WIRING DIAGRAM ILLUSTRATES THE ACTUATOR IN THE OPEN POSITION

WIRING DIAGRAM FOR STANDARD 1PH/60Hz/AC ELECTRIC ACTUATOR ILLUSTRATING OPTIONAL HEATER, THERMOSTAT & BRAKE.

DWG. #990520

### **MAINTENANCE:**

After your Milwaukee electric actuator has been properly installed there is little or no maintenance ever required. The gear train has been permanently lubricated at the factory and requires no routine maintenance. In the event it becomes necessary to perform maintenance on the actuator upon reassembling, we recommend using Lubriplate EMB grease.

### **DUTY CYCLE:**

Milwaukee's actuators are rated 100 LB-IN up to 1500 LB-IN output torque are rated for 25% duty cycle at 100% ambient temperature at rated torque (75% duty cycle motors are available upon request). Actuators rated for 2000 LB-IN output torque and greater are rated for continuous duty. All direct current (dc) motors are rated for 75% duty cycle.

### **THERMAL OVER LOAD:**

All alternating current (ac) motors are equipped with thermal over load protection to guard the motor against damage from over heating.

### **MECHANICAL OVER LOAD:**

Actuators are all designed to withstand stall conditions. It is not recommended to subject the unit to repeated stall conditions; however, should it occur the actuator would not experience gear damage.

**ORDERING PARTS:**

When ordering parts please specify:

Actuator model number, Actuator serial number, Part number and Part description.

**RECOMMENDED SPARE PARTS:**

**Two Position Actuators:**

Set of cams and switches.

**Modulating Actuators:**

Set of cams, switches, feedback potentiometer and a positioner card.

**NEMA 7 ENCLOSURE:**

In general, operation and maintenance of a NEMA 7 electric actuator is no different than that of a NEMA 4 electric actuator. However, there are some precautions that must be followed.

1. **DO NOT** install in ambient temperatures that 140 degrees F.
2. **DO NOT** under any circumstances remove the actuator cover while in a hazardous location, this could cause ignition of hazardous atmospheres.
3. **DO NOT** under any circumstances use a NEMA 7 electric actuator in a hazardous location that does not meet the specifications for which the actuator was designed. The actuator is clearly tagged with the NEMA classification it was designed for.
4. Mount, test and calibrate actuator on valve in non-hazardous location.
5. When removing the cover care must be taken not to scratch, scar or deform the flame path of the cover or base of the actuator, this will negate the NEMA 7 rating of the enclosure.
6. When replacing the cover on actuators rated NEMA 4 and 7 take care that the gasket is in place to assure the proper clearance after the cover is secured. After securing the cover screws check the clearance between the cover and the base, a .002” thick by 1/2” wide feeler gauge may not enter between the two mating faces more than .125”.
7. All electrical connections must be to state and local codes and in accordance with the specifications for which the unit is being used.

After proper installation the actuator will require little or no maintenance, in the event maintenance is required remove it from the hazardous location before attempting to work on it. If the actuator is in a critical application and down time is not permitted it is advisable to have a spare actuator in stock.

**TROUBLE SHOOTING:**

<b>SYMPTOM</b>	<b>PROBLEM</b>	<b>SOLUTION</b>
Actuator does not respond to control signal.	Power not on. Actuator wired wrong . Wrong voltage.  Thermal overload activated.  Actuator and valve in opposite positions when actuator was mounted.	Turn on power. Check wiring diagram & rewire. Check power supply & make appropriate changes. Allow motor to cool, actuator will automatically reset. Remove actuator and rotate 90 degrees & remount.
Actuator will not open or close completely.	Travel limits set wrong. Valve torque too high for actuator. Mechanical stops not removed.	Reset cams, see Pgs. 3 & 4. Install correct size actuator. Remove stops, CAUTION: Do not remove any part required for proper operation.
Valve oscillates.	Valve torque too high for actuator. Actuator without brake installed on butterfly valve. Motor brake out of adjustment. Set screw loose in brake disc.	Install correct size actuator.  Install brake. Adjust brake. Adjust brake and tighten set screw.
Motor runs but output shaft does not rotate.	Gear damage or sheared pin.	Contact nearest distributor.