

“E” Series Electric Actuator Installation, Operation & Maintenance Manual

INTRODUCTION:

Thank you for selecting *SVF Flow Controls, Inc.* for your valve automation requirements. We at *SVF* are proud of our products and feel confident they will meet or exceed your expectations of quality and reliability.

Every precaution has been taken to insure that your equipment will arrive undamaged; however, accidents do occur. Therefore, the first thing you must do upon receipt of your package is to inspect it for damage. If the box is damaged there is a possibility that the equipment inside the box may be damaged as well. If this is the case **YOU MUST FILE A CLAIM** with the delivering CARRIER. All shipments are F.O.B. our factory and it is **YOUR RESPONSIBILITY** to file a claim for damages.

STORAGE:

If the actuators are scheduled for installation at a latter date:

1. Store off the floor.
2. Store in a climate controlled building.
3. Store in a clean and dry area.

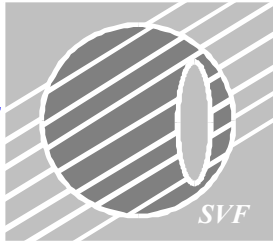
FOR FUTURE REFERENCE RECORD:

1. Actuator model number _____
2. Actuator enclosure type NEMA 4 __, NEMA 4X _____, NEMA 7 _____, NEMA 4 & 7 _____
3. Actuator output torque _____ LB-IN
4. Motor characteristics, Voltage _____ Hertz _____ Phase _____
5. Actuator serial number _____
6. Date of installation _____ Put into operation _____
7. Valve Data:
 - 7a. Manufacturer _____
 - 7b. Style & fig. No. _____
 - 7c. Size _____
 - 7d. End connection _____
 - 7e. Material of construction, Body _____ Stem & ball _____
 - 7f. Brake away torque _____ LB-IN @ _____ PSI _____
 - 7g. Other helpful data _____

MEDIA:

1. System media _____
2. Temperature, _____ deg. F. Maximum, _____ deg. F. Minimum _____
3. Pressure _____ PSI

As this information is listed it is important to pay attention to all of the actuator specifications relative to the valve specifications and system requirements. If the actuator is not properly sized for the valve and application the life will be shortened or it may not work at all.



TOOLS REQUIRED:

E-100-W4E

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.

E-200, E-300

Cover screws	"W4S", Phillips head screwdriver, "4-20 MODELS" 9/64 Allen wrench, NEMA 7 enclosure "XRS MODELS", 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.

E-675, E-1000, E-1500

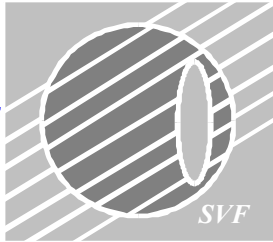
Cover screws	"W4S MODELS" 5/32" Allen wrench, NEMA 7 enclosure "X4S MODELS", 7/16" socket.
Terminal strip screws	3/16" wide flat head screw driver.
Cam setscrew	5/64" Allen wrench.
Mounting pad screws	1/2" socket.

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

INSTALLATION:

If mounting the actuator to a valve please note that 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:

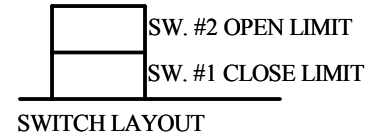
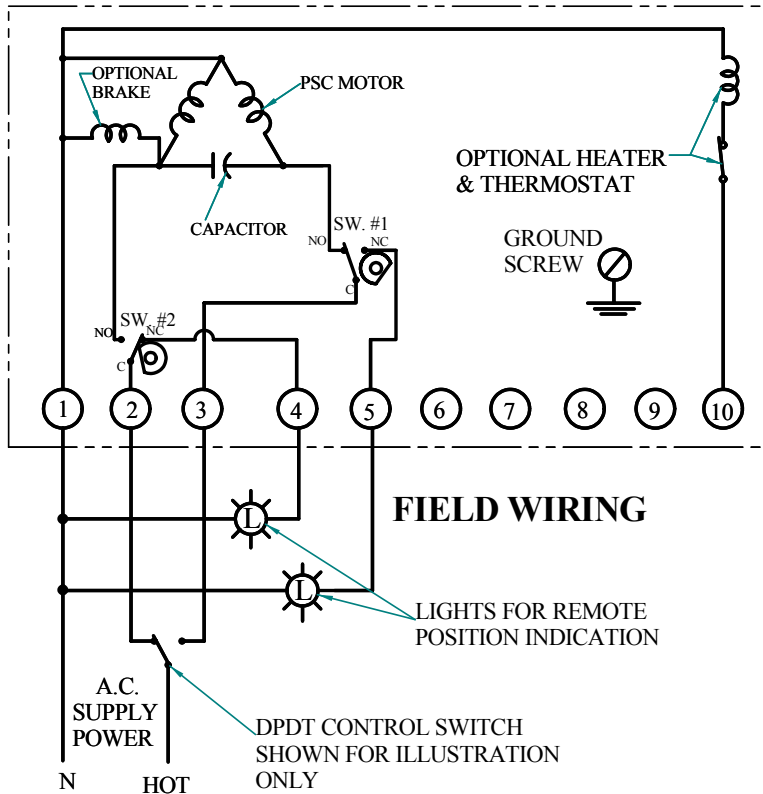
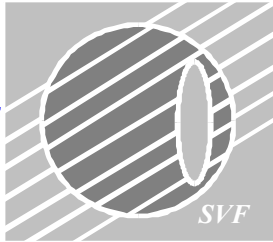
After checking the alignment of the valve port calibration may be required.

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 step "1a" of "To set OPEN position".

To set CLOSED 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.
 - 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 step "1a" of "To set CLOSED 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 SVF 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:

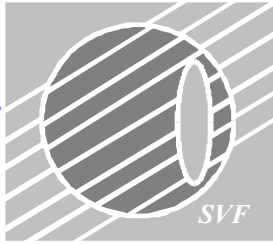
SVF actuators rated 100 LB-IN up to 1500 LB-IN output torque are rated for 25% duty cycle at 100% ambient temperature at rated torque (75% duty cycle motors are available upon request). Actuators rated for 2000 LB-IN output torque and greater are rated for continuous duty. All direct current (DC) motors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

SVF's 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:

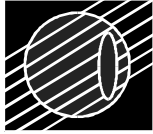
Set of cams, switches, feedback potentiometer and a positioner card.

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** under any circumstances remove the actuator cover while in a hazardous location, this could cause ignition of hazardous atmospheres.
2. **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.
3. Mount, test and calibrate actuator on valve in non-hazardous location.
4. 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.
5. 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".
6. 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.



Troubleshooting Electric Rotary Valve Actuators

This document has been created to assist you with an understanding of the common causes of actuator failure. Most often the cause is a simple wiring oversight or voltage incompatibility. This troubleshooting guide reflects common Causes and Solutions for most valve actuators.

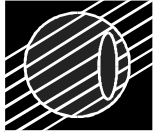
NOTES ON MAINTENANCE PROCEDURES: WARNING!!! In all cases, never operate an automated valve while under pressure or in a live process. Always disconnect supply air or voltage before any disassembly or maintenance is performed. Always be aware of the area classification for electrical service. Shut off and remove all electrical equipment from a hazardous area before performing any maintenance. If ever in doubt, choose safety first!

When contacting your manufacturer be prepared to provide:

Model Number	Usually located on the actuator enclosure
Your control voltage.	AC/DC, Single- or three-phase.
Valve type and size it is operating.	Ball, butterfly, etc. Line size.
Intended service	On/Off, modulating etc.
Installed options (if known)	Does the unit have; positioner, heater/thermostat, extra switches, etc.?

A-Problem: Actuator will not operate

Possible Cause	Solution
Thermal Overload protection is active.	Allow actuator to cool. Decrease operating frequency (Duty Cycle)
Capacitor is loose or connected incorrectly.	Check wiring and diagram to correct capacitor connection.
Wires, switches or other leads may be disconnected or loose.	Inspect and re-connect.
Wires at terminal block loose or disconnected.	Inspect and re-connect.
Motor is damaged or otherwise inoperable.	Confirm voltage. Apply power without switches in circuit. Replace motor assembly.
Ambient temperature is too low causing inoperability.	Install heater and thermostat.
Optional accessories, circuit boards incorrectly installed or wiring is loose.	Check installation. Refer to wiring diagram. Replace or re-install.



B-Problem: Motor seems stalled. It "hums" but will not operate

Possible Cause	Solution
Supply voltage (power) is applied to both sides of the motor simultaneously.	Check wiring. Make corrections.
System wiring has more than one actuator powered from same parallel source.	Apply isolating relays to control circuit.
Capacitor has failed.	Replace capacitor.
Valve requires too much operating torque.	Check valve torque. Look for obstructions to rotary motion (mechanical stops on valve, etc.)
Motor has failed.	Replace motor.
Failed circuit board accessory.	Inspect, re-wire or replace boards.

C-Problem: Motor operates but output shaft does not turn

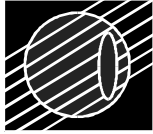
Possible Cause	Solution
Manual override (if supplied) is not properly engaged with gear train.	Manually engage override to the "automatic" position.
Damaged or stripped gears in drive train.	Replace gears or gearbox.

D-Problem: Actuator turns in one direction only.

Possible Cause	Solution
Wires at terminal block loose or disconnected.	Check wiring. Make corrections.
Wires at the motor connection are loose or disconnected.	Check wiring. Make corrections.
Limit switch for the reverse direction is engaged with the cam.	Inspect and adjust the cam.
Failed circuit board accessory.	Inspect, re-wire or replace boards.
DC Motor – Polarity is not switching.	Install external switching/relay. See manufacturers wiring diagram.

E-Problem: Actuator turns in the wrong direction.

Possible Cause	Solution
Motor leads or limit switches are wired incorrectly.	Inspect and re-connect.
Actuator may be wired for uni-directional operation. Or may be a uni-directional model.	Refer to manufacturers wiring diagram. Re-wire.



F-Problem: Actuator does not stop at the desired position.

Possible Cause	Solution
Actuator rotation is limited by the action of a cam on the limit switch. Cam needs adjustment/setting.	Adjust/set cam.
Cam may be loose. Set screw is loose.	Adjust/set cam.
Limit switch is not working/contacting.	Replace limit switch.
Limit switches may be wired in reverse operation.	Inspect. Re-set.
Cam may be loose. Set screw is loose.	Adjust/set cam.
Limit switch is not working/contacting.	Replace limit switch.
Limit switches may be wired in reverse operation.	Inspect. Re-set.

G-Problem: Actuator repeatedly "hunts" at the end of travel.

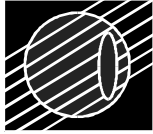
Possible Cause	Solution
Valve has reached "closed" position before the limit switch cuts off power.	Adjust/set cam.
Line pressure or seating torque is causing actuator to momentarily "reverse".	Install a motor brake (Especially for rubber seated butterfly valves). Adjust/set cam.

H-Problem: Moisture and/or corrosion is present inside enclosure.

Possible Cause	Solution
Gasket seal is missing or installed incorrectly.	Replace gasket seal. Dry unit.
Water is entering through the conduit entry.	Inspect/Re-seal.
Cover was removed or left off during high humidity or rain.	Add a desiccant packet to the enclosure. Dry unit.
Cover not attached tightly or with the use of all cover bolts.	Dry unit. Tighten cover.
Humid environment.	Add Heater/Thermostat.

I-Problem: Power supply fuse repeatedly fails

Possible Cause	Solution
Stalled motor draws excessive current.	See "B" above.
Incorrect power accessories (such as Heater/Thermostat).	Inspect. Correct.
Excessive cycling. High current draw.	Inspect operation of control system.
Optional accessories incorrectly installed or incorrectly grounded.	Check control loop. Re-install boards.

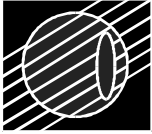


SVF Flow Controls
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Performance Engineered

J-Problem: Heater / Thermostat not working.

Possible Cause	Solution
Wired incorrectly.	See wiring diagram. Re-install.
Voltage is incorrect.	Check. Re-install.



Engineering Manual on Electric Actuators

Product Specifications

Output Torque: 100 Lbf.in.
 Speed: 2.5 sec/90 Degrees
 Supply: 115VAC, 60Hz, 1 Phase

Motor:
 Reversible, 75% Duty Cycle
 Thermal Overload Protection

Enclosure:
 Cast Aluminum, epoxy coated
 ISO 5211 mounting pad
 Permanent lubrication
 Universal mounting

Temperature: -40 to 150°F
 (Heater recommended below zero degrees ambient)

Wiring Diagram (Standard Single Phase AC)

Operation

Power to Terminals 1 and 2 drives CCW (Open)
 Power to Terminals 1 and 3 drives CW (Close)
 Lamp connected to Terminals 1 and 4 indicates OPEN
 Lamp connected to Terminals 1 and 5 indicates CLOSED

Note: Allow 2.5 inches for cover removal

0.250, 0.38, 0.375 Dia., 1/2" NPT Conduit Entry, 0.39, 1, 2.31, 0.81, 5.63, 4.50, 1.31, 4.00, 0.433

1.969 Dia. BC
4 Holes
1/4-20 Tap, 0.38 Deep
ISO F05

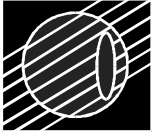
1.417 Dia. BC
4 Holes
1/4-20 Tap, 0.38 Deep
ISO F03

All dimensions are in inches

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 Santa Fe Springs, CA 90670
 1-800-783-7836

SVF Flow Controls
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Electric Actuator Data Sheet
 Model: E-100



Engineering Manual on Electric Actuators

Product Specifications

4-20 mA DC Positioning Electric Actuator

Enclosure:
Cast Aluminum, epoxy coated
ISO 5211 mounting pad
Permanent lubrication
Universal mounting

Output Torque:
E-200 = 200 Lbf.in.
E-300 = 300 Lbf.in.

Speed: 10 sec/90 Degrees
Supply: 115VAC, 60Hz, 1 Phase

Motor:
Reversible, 75% Duty Cycle
Thermal Overload Protection

Temperature: -40 to 150°F
(Heater recommended below zero degrees ambient)

Wiring Diagram (4-20 mA DC Positioner)

The diagram shows a MOTOR connected to a POSITIONER BOARD. The board has terminals 1 through 8. Terminal 1 is L2 NEUTRAL, 2 is L1 LINE, 3 is EARTH GND, 4 is SIGNAL GND, 5 is 1-5V/4-20 mA INPUT, 6 is 0-10V INPUT, 7 is +10V OUTPUT, and 8 is +24V OUTPUT. The motor is connected to terminals 1, 2, and 3. A thermal overload protection device is connected to terminals 4 and 5.

Note: Allow 3 inches for cover removal

1/2" NPT Conduit Entry

0.630

2.96

7.34

6.75

2.11

4.75

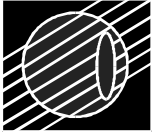
0.551

1.969 Dia. BC
4 Holes
1/4-20 Tap, 0.44 Deep
ISO F05

All dimensions are in inches

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Electric Actuator Data Sheet
Model: E-200 & E-300 (4-20)



Engineering Manual on Electric Actuators

Product Specifications

Output Torque:
E-200 = 200 Lbf.in.
E-300 = 300 Lbf.in.
Speed: 5 sec/90 Degrees
Supply: 115VAC, 60Hz, 1 Phase

Enclosure:
Cast Aluminum, epoxy coated
ISO 5211 mounting pad
Permanent lubrication
Universal mounting

Temperature: -40 to 150°F
(Heater recommended below zero degrees ambient)

Motor:
Reversible, 25% Duty Cycle
Thermal Overload Protection

Wiring Diagram (Standard Single Phase AC)

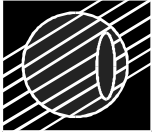
Operation

Power to Terminals 1 and 2 drives CCW (Open)
Power to Terminals 1 and 3 drives CW (Close)
Lamp connected to Terminals 1 and 4 indicates OPEN
Lamp connected to Terminals 1 and 5 indicates CLOSED

All dimensions are in inches

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Electric Actuator Data Sheet
Model: E-200 & E-300



Engineering Manual on Electric Actuators

Product Specifications

Model / Torque / Speed per 90°
E-675 / 675 Lbf.in. / 15sec
E-1000 / 1000 Lbf.in. / 15sec
E-1500 / 1500 Lbf.in. / 30sec

Supply: 115VAC, 60Hz, 1 Phase

Motor:
Reversible, 25% Duty Cycle
Thermal Overload Protection

Enclosure:
Cast Aluminum, epoxy coated
ISO 5211 mounting pad
Permanent lubrication
Universal mounting

Temperature: -40 to 150°F
(Heater recommended below zero degrees ambient)

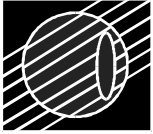
Wiring Diagram (Standard Single Phase AC)

Operation

Power to Terminals 1 and 2 drives CCW (Open)
Power to Terminals 1 and 3 drives CW (Close)
Lamp connected to Terminals 1 and 4 indicates OPEN
Lamp connected to Terminals 1 and 5 indicates CLOSED

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Electric Actuator Data Sheet
Model: E-675, E-1000, E-1500



Engineering Manual on Electric Actuators

Product Specifications

Model / Torque / Speed per 90°
E-2000/ 2,000 Lbf.in./ 12 Sec.
E-3840/ 3,840 Lbf.in./ 14 Sec.

Supply: 115VAC, 60Hz, 1 Phase

Motor:
Reversible, 100% Duty Cycle
Thermal Overload Protection

Enclosure:
Cast Aluminum, epoxy coated
Permanent lubrication
Universal mounting

Temperature: -40 to 150°F
(Heater recommended below zero degrees ambient)

Wiring Diagram (Standard Single Phase AC)

Operation

Power to Terminals 1 and 2 drives CCW (Open)
Power to Terminals 1 and 3 drives CW (Close)
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Electric Actuator Data Sheet
Model: E-2000, E-3840