ELECTRIC, QUARTER-TURN, REVERSIBLE ACTUATION

INTRODUCTION:
Thank you for selecting ***NEXTEK Controls*** for your valve automation requirements. We 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. It is your responsibilty to file a claim for damages.

See the last page of this document to record information relating to your product, application and installation.

STORAGE:
If the actuators are scheduled for installation at a later date:

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

NEMA 7 ENCLOSURE: (Hazardous Area 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.

TOOLS REQUIRED:

ITEM	E-100-W4E	E-200, E-300	E-675, E-1000, E-1500
Cover screws	9/64" Allen wrench	"W4S", Phillips head screwdriver. "4-20 MODELS" 9/64 Allen wrench. NEMA 7 enclosure "X4S MODELS", 7/16" socket	"W4S MODELS" 5/32" Allen wrench. NEMA 7 enclosure "X4S MODELS", 7/16" socket
Terminal strip screws	1/8" wide flat head screwdriver	1/8" wide flat head screwdriver	3/16" wide flat head screwdriver
Cam set screw	5/64" Allen wrench	5/64" Allen wrench	5/64" Allen wrench
Mounting pad screws	3/8" socket	3/8" socket	1/2" socket
Position indicator	-N/A-	5/64" Allen wrench	-N/A-

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

INSTALLATION: **NOTE: Mounting & Calibration should be performed in a safe, clean and non-hazardous area!**
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 the 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.

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.

CALIBRATION: NOTE: Mounting & Calibration should be performed in a safe, clean and non-hazardous area
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 set screw 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 set screw.

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 the 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 closed position the set screw 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.

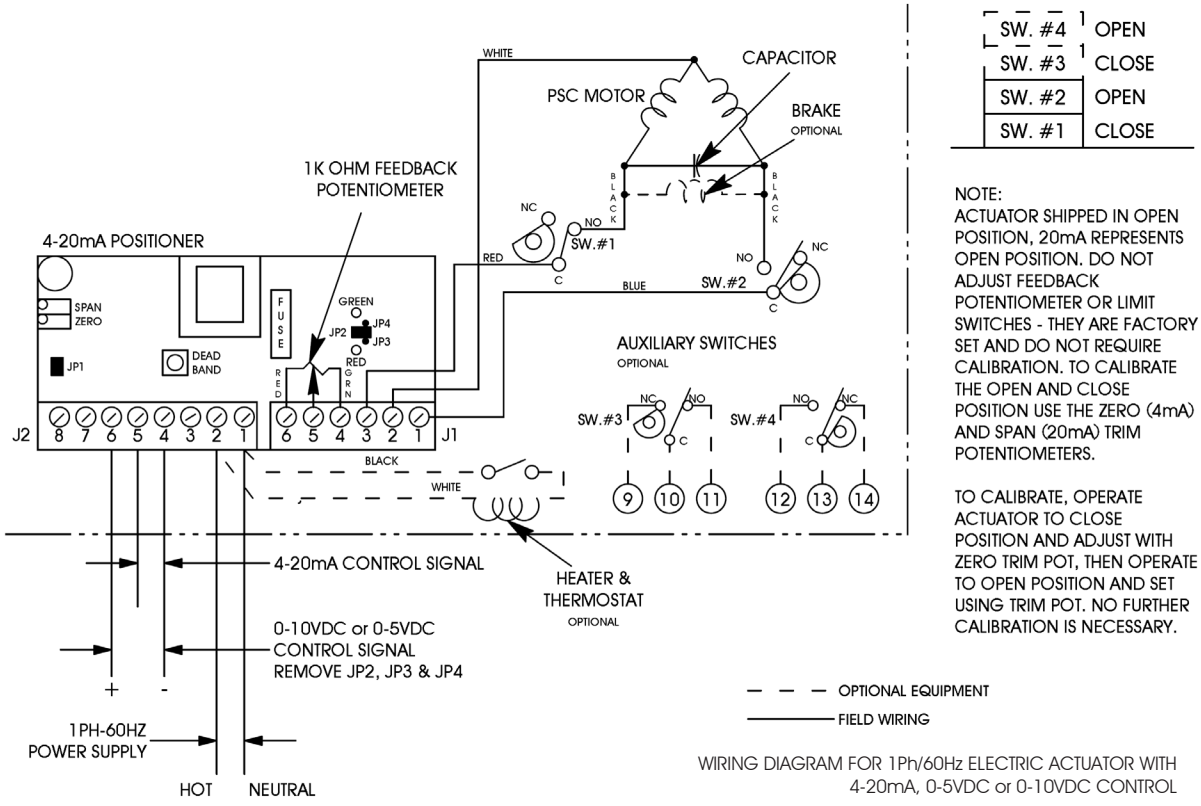
3aa. Securely tighten the set screw.

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".



WIRING DIAGRAM FOR 1Ph/60Hz ELECTRIC ACTUATOR WITH 4-20mA, 0-5VDC or 0-10VDC CONTROL

MAINTENANCE:

After your NEXTEK Controls 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:

NEXTEK Controls 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:

NEXTEK Controls 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.

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	Refer to wiring diagram. Replace or reinstall.

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.

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

Possible Cause	Solution
Valve has reached "closed" position before the limit switchcuts 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 Problem "B"
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.

J-Problem: Heater / Thermostat not working.

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

ALL DIMENSIONS IN INCHES

Product Specifications

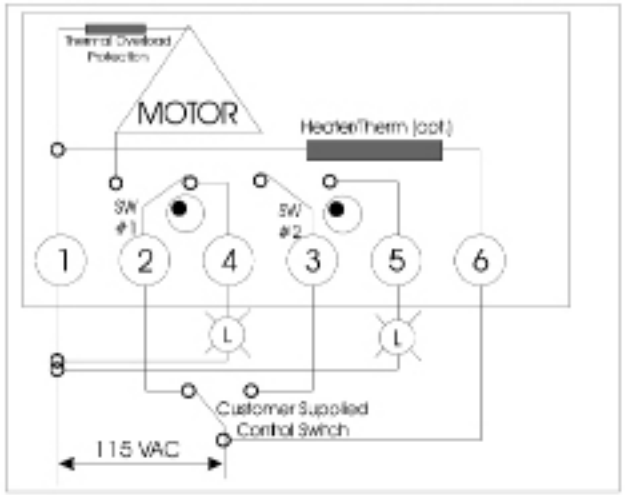
Output Torque: 100 Lbf.in.
Speed: 2.5 sec/90 Degrees
Supply: 115VAC, 60Hz, 1 Phase

Motor:
Reversible, 75% Duty Cycle
Thermal Overload Protection

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

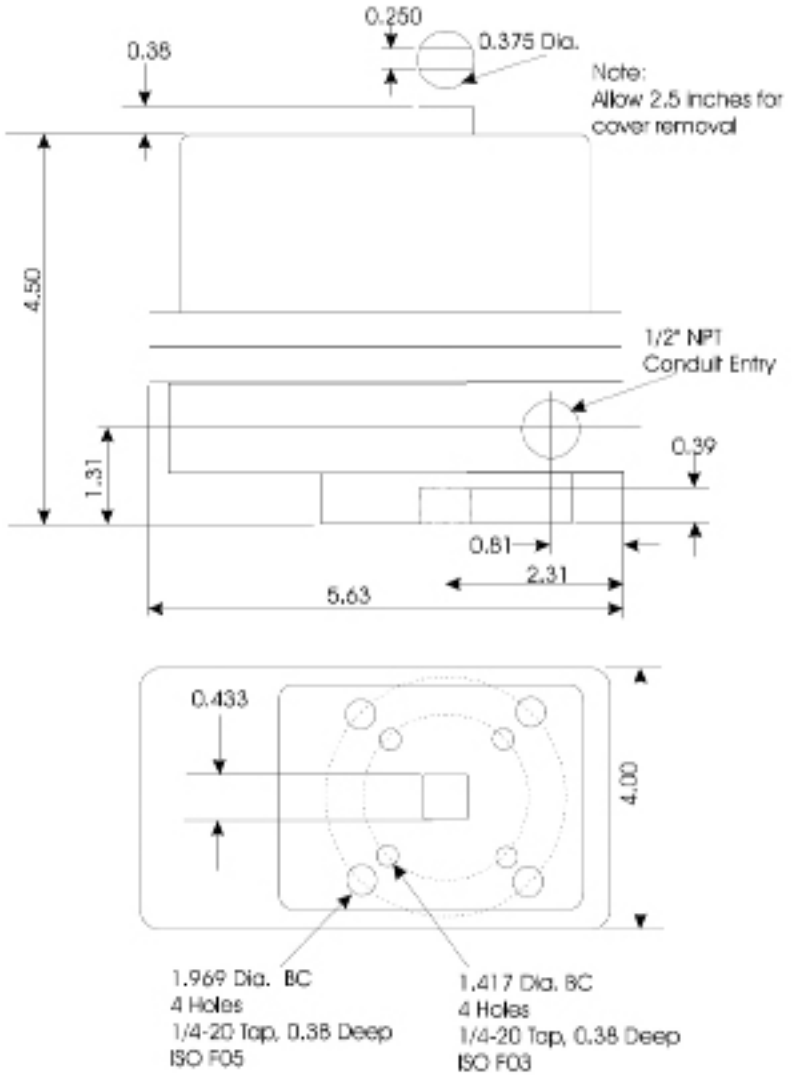
Temperature: -40 to 150°F
(Heater recommended below zero degrees ambient)

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



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Electric Actuator Data Sheet
Model: E-100

WIRING DIAGRAM #1

ALL DIMENSIONS IN INCHES

Product Specifications

4-20 mADC Positioning Electric Actuator

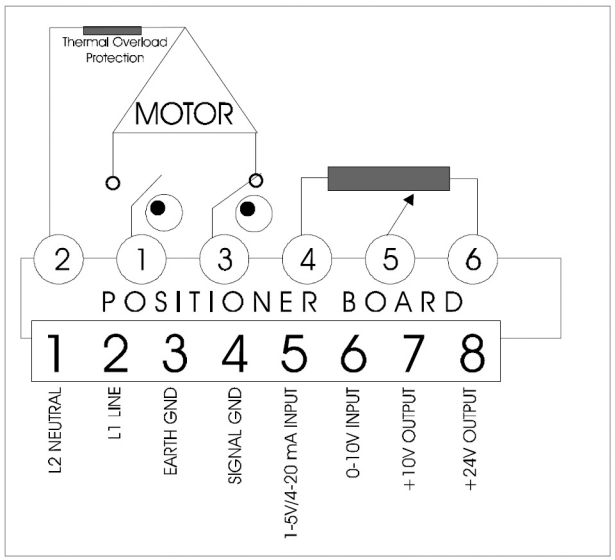
Output Torque:
E-200 = 200 Lbf.in.
E-300 = 300 Lbf.in.
Speed: 10 sec/90 Degrees
Supply: 115VAC, 60Hz, 1 Phase

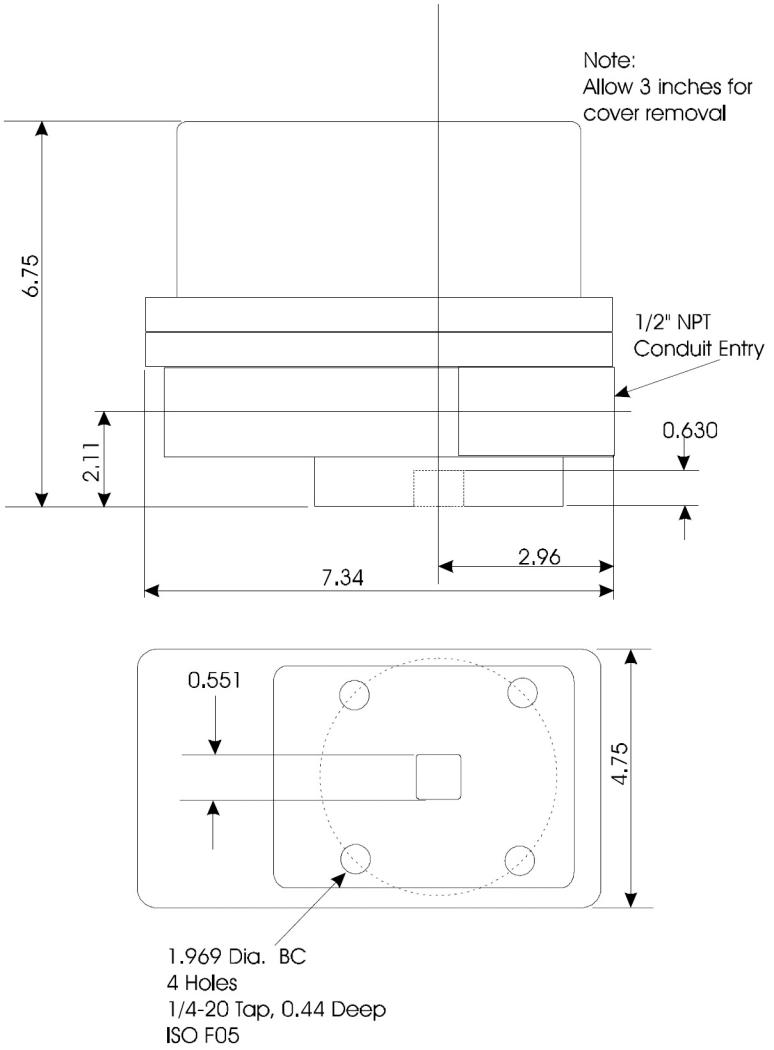
Enclosure:
Cast Aluminum, epoxy coated
ISO 5211 mounting pad
Permanent lubrication
Universal mounting

Motor:
Reversible, 75% Duty Cycle
Thermal Overload Protection

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

Wiring Diagram (4-20 maDC Positioner)





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

WIRING DIAGRAM #2

ALL DIMENSIONS IN INCHES

Product Specifications

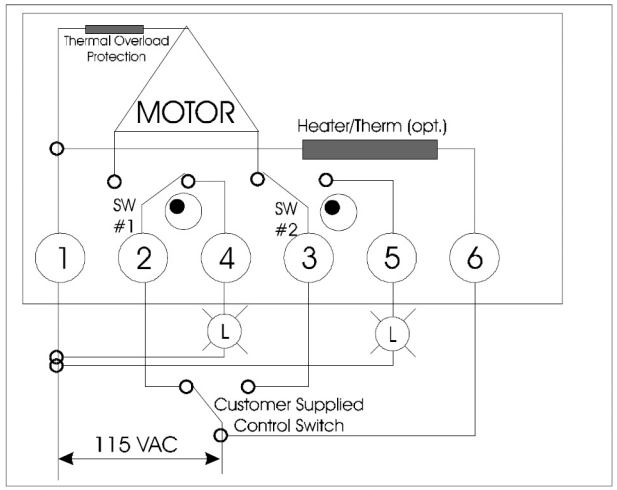
Output Torque:
E-200 = 200 Lbf.in.
E-300 = 300 Lbf.in.
Speed: 5 sec/90 Degrees
Supply: 115VAC, 60Hz, 1 Phase

Motor:
Reversible, 25% Duty Cycle
Thermal Overload Protection

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

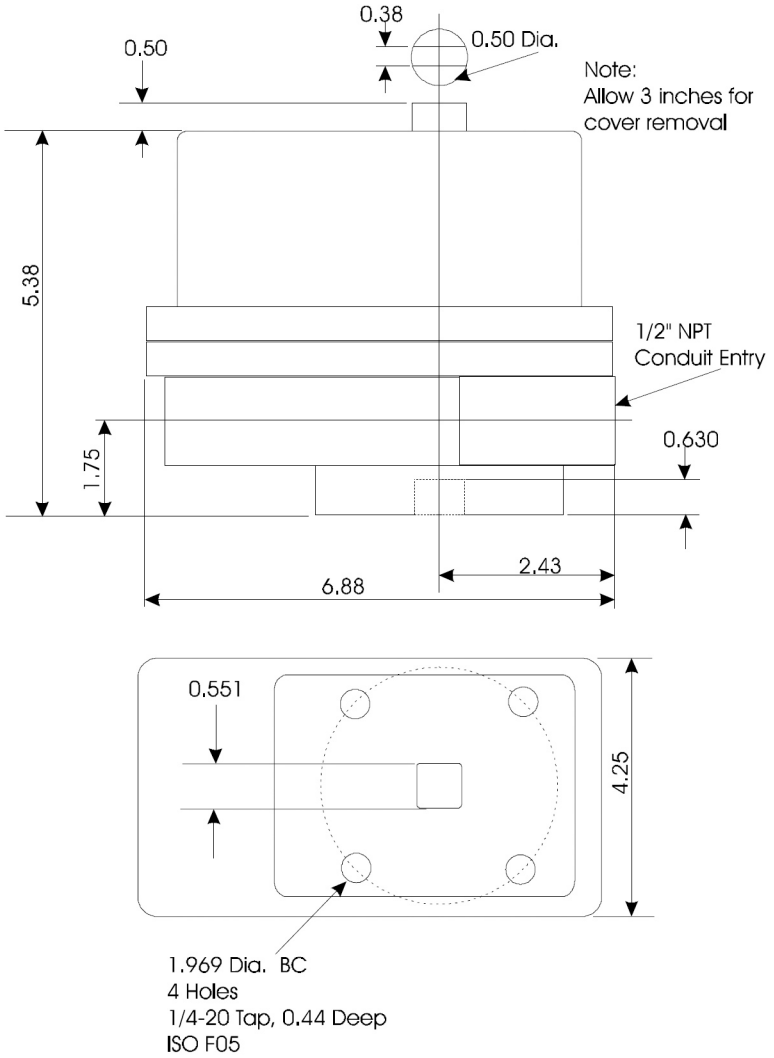
Temperature: -40 to 150°F
(Heater recommended below zero degrees ambient)

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-200 & E-300

WIRING DIAGRAM #3

ALL DIMENSIONS IN INCHES

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

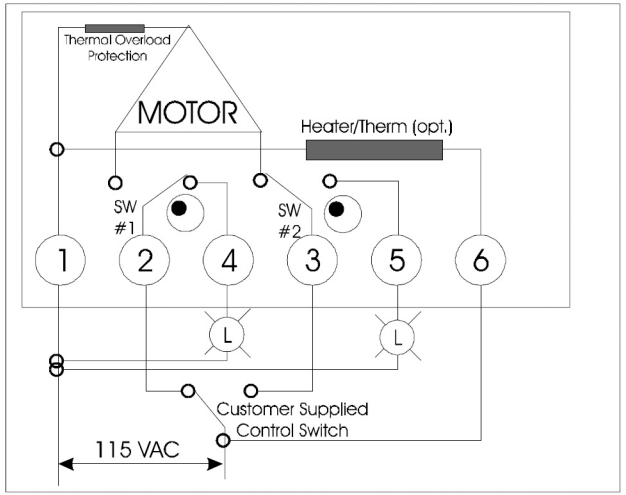
Supply: 115VAC, 60Hz, 1 Phase

Motor:
Reversible, 25% Duty Cycle
Thermal Overload Protection

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

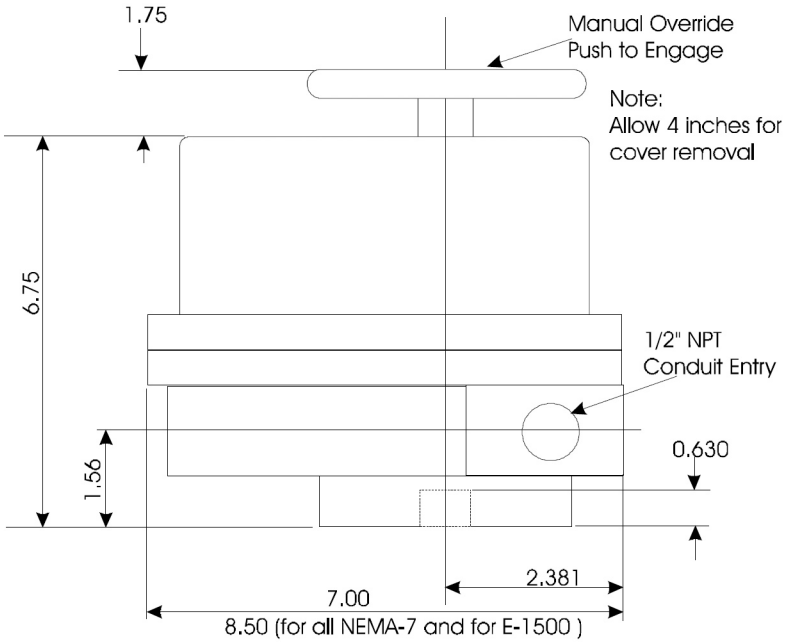
Temperature: -40 to 150°F
(Heater recommended below zero degrees ambient)

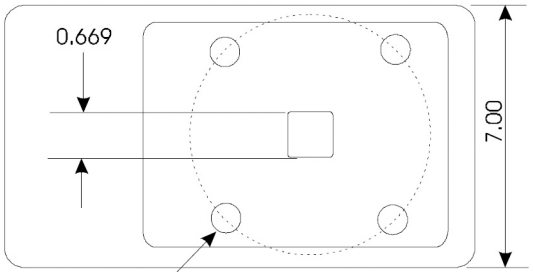
Wiring Diagram (Standard Single Phase AC)



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





2.756 Dia. BC
4 Holes
5/16-18 Tap, 0.38 Deep
ISO F07

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

WIRING DIAGRAM #4

ALL DIMENSIONS IN INCHES

Product Specifications

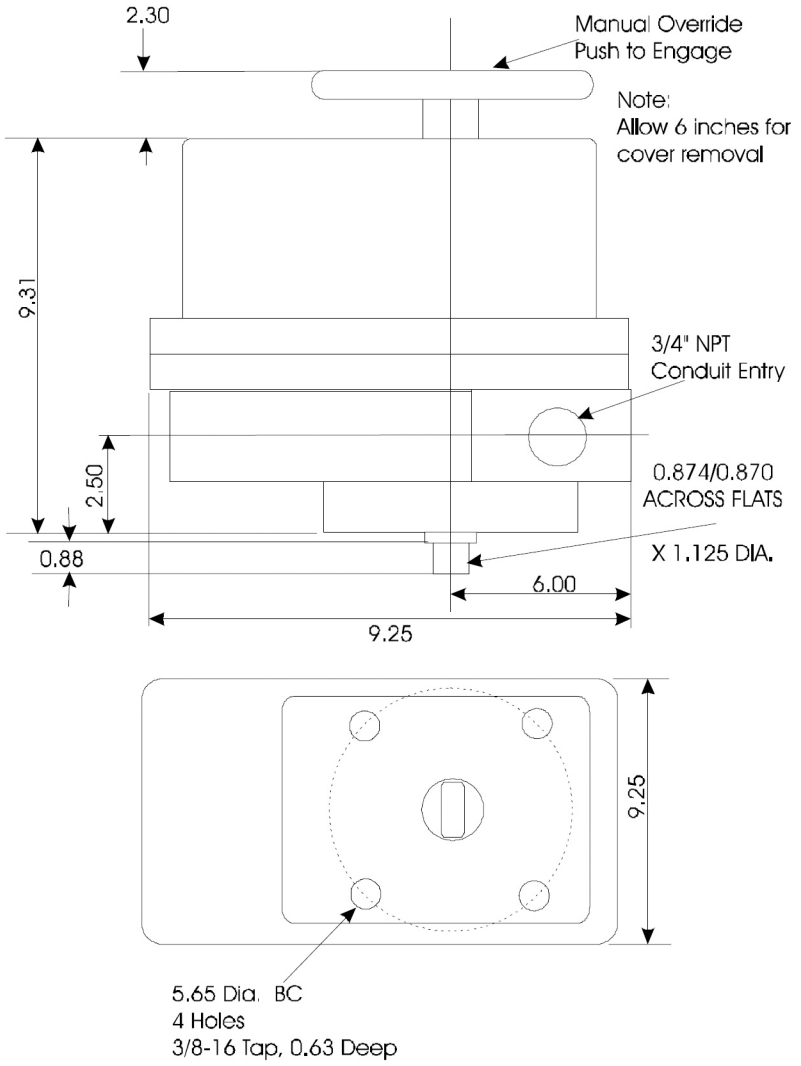
Model / Torque / Speed per 90°
E-2000/ 2,000 Lbf.in./ 12 Sec.
E-3840/ 3,840 Lbf.in./ 14 Sec.

Supply: 115VAC, 60Hz, 1 Phase

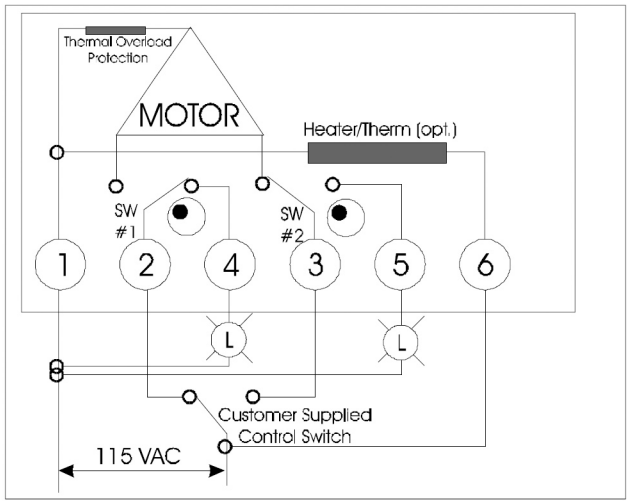
Motor:
Reversible, 100% Duty Cycle
Thermal Overload Protection

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)
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
E-2000X

WIRING DIAGRAM #5

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: _____in-lbs
4. Motor characteristics: Voltage_____ Hertz_____ Phase_____
5. Actuator serial number: _____
6. Date of installation: _____ Put into operation: _____
7. Valve Data:
   - 7a. Manufacturer: _____
   - 7b. Style & Model No.: _____
   - 7c. Size: _____
   - 7d. End connection(s): _____
   - 7e. Materials: Body_____ Ball_____ Stem_____
   - 7f. Brake away torque: _____in-lbs @ _____PSI
   - 7g. Other helpful data: _____

MEDIA:

1. System Media: _____
2. Temperature: _____ deg. F. Maximum _____ deg. F. Minimum
3. Pressure: _____ PSI

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.

Notes: