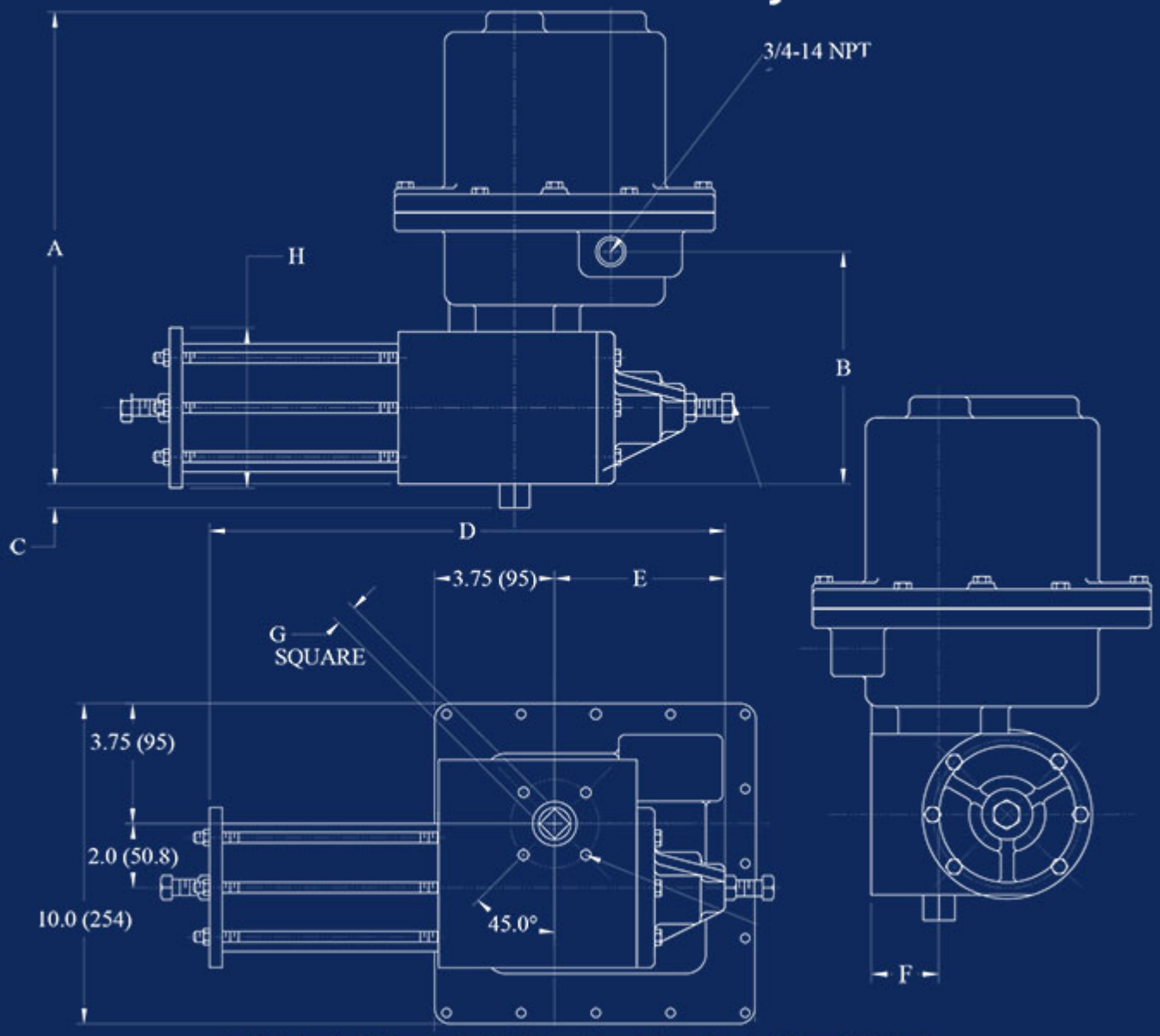
INDELAC

CONTROLS, INC.



ELECTRIC ACTUATOR

Spring Return

Installation, Operation & Maintenance Manual

INTRODUCTION:

Thank you for selecting Indelac Controls, Inc. (*ICI*) for your valve or damper automation requirement. We at *ICI* 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 later 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,_____. 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:

ADDITIONAL TOOLS WILL BE REQUIRED FOR THE SCREWS TO MOUNT THE VALVE TO THE ACTUATOR.

Cover Screws	5/32" Allen Wrench, **NEMA 7** Enclosure, 7/16" Socket.
Terminal Strip Screws	3/16" Wide Flat Head Screwdriver.
Cam Set Screw	5/64" Allen Wrench.
Mounting Pad Screws	½" Socket.

SUGGESTED MAXIMUM TORQUE VALUES FOR FASTENERS (IN-LBS.)

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
¼-20	65	75	79	45
5/16-18	129	132	138	80
3/8-16	212	236	247	143
½-13	465	517	542	313
5/8-11	1000	1110	1160	715

ABOUT ELECTRIC SPRING RETURN ACTUATORS:

ICI's electric spring return actuators are fail-safe actuators designed to prevent catastrophic loss of system media or production caused by a sudden loss of electricity. They are not designed for control applications. When used in the manner for which they were designed they will deliver years of protection for your system. Please read these instructions completely before installing and using your new ICI electric spring return actuator.

INSTALLATION:

The actuator is shipped in the DESIGNATED FAIL position from the factory; make sure the valve and actuator are in the same position before mounting.

1. Manually position valve to the designated fail position, if the actuator is to fail close on loss of power, the valve must be in the closed position when mounting the actuator.
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, and 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 of the actuator. If there is no wiring diagram call the factory to obtain the proper wiring diagram before attempting to wire the actuator. Equipment failure due to improper wiring is not covered under the factory warranty.

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. Check to ensure that the cover gasket is properly set in its groove. If the gasket is out of the groove, manipulate it back into place with your fingers to ensure a proper seal to eliminate the ingress of water, dust, or other debris.
11. Replace cover and secure cover screws.

NOTE: FOR QUESTIONS REGARDING ES2 MODELS MOUNTED TO AN EXTERNAL MANUAL OVERRIDE GEARBOX PLEASE CONSULT THE FACTORY.

CALIBRATION OF STANDARD OPEN/CLOSE MODEL:

AFTER CHECKING THE ALIGNMENT OF THE VALVE PORT, CALIBRATION MAY BE REQUIRED.

To Set The Open Position:

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 IS EASILY ACCESSIBLE.

1. If the valve did not open completely.
- **a.** Loosen 8-32 set screw in top cam.
- **b.** 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.
- **c.** Securely tighten the setscrew.

2. If valve traveled too far open.

CAUTION: VALVES WITH MECHANICAL STOPS MAY BE DAMAGED OR CAUSE DAMAGE TO THE ACTUATOR IF ALLOWED TO TRAVEL TOO FAR.

- **a.** Apply power to terminal connections #1 and #3, the valve will begin to rotate CW, allow it to travel to the mid position.
- **b.** Follow directions of “To set open position”.

3. After the position is set and if open is the designated fail position, rotate the adjusting screw clockwise until the screw touches the mechanical stop then rotate it counter clockwise one full turn and lock the jam nut so the adjusting screw remains in position. By doing this the mechanical stop never comes in contact with the adjusting screw except upon loss of power.

To Set The Close Position:

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 OPEN POSITION THE SETSCREW SECURING THE CAM TO THE SHAFT IS EASILY ACCESSIBLE.

1. If valve did not close completely.
   - **a.** Loosen 8-32 set screw in bottom cam.
   - **b.** 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.
   - **c.** Securely tighten the setscrew.

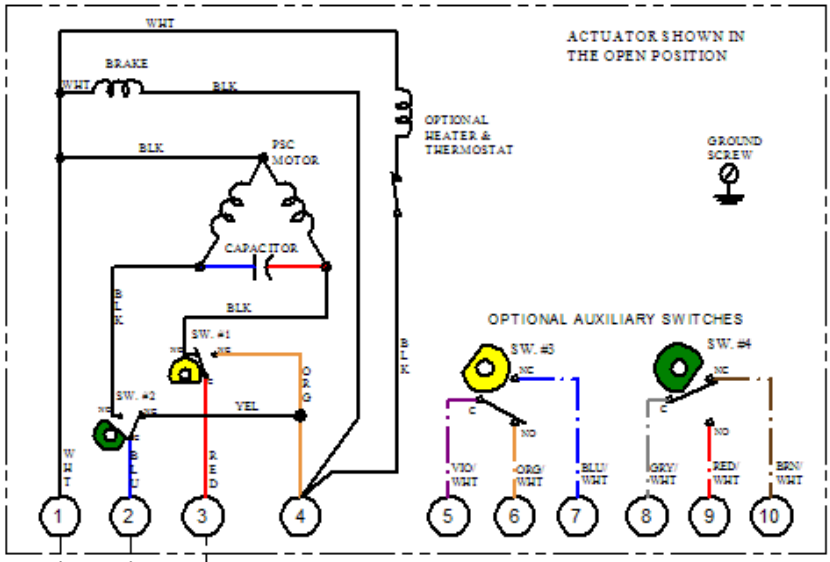
2. If the valve has traveled too far closed.

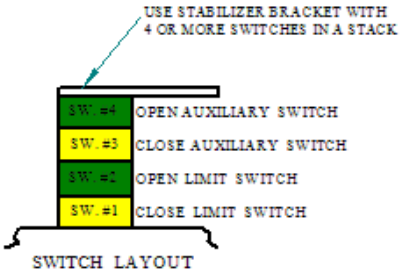
CAUTION: VALVES WITH MECHANICAL STOPS MAY BE DAMAGED OR CAUSE DAMAGE TO THE ACTUATOR IF ALLOWED TO TRAVEL TOO FAR CLOSED.

   - **a.** Apply power to terminal connections #1 and #2, the valve will begin to rotate CCW, allow it to travel to the mid position.
   - **b.** Follow directions of “To Set Close Position”.

3. After the position is set and if open is the designated fail position, rotate the adjusting screw clockwise until the screw touches the mechanical stop then rotate it counter clockwise one full turn and lock the jam nut so the adjusting screw remains in position. By doing this the mechanical stop never comes in contact with the adjusting screw except upon loss of power.

CUSTOMER ELECTRICAL CONNECTIONS:





W990910

SPDT CONTROL SWITCH SHOWN FOR ILLUSTRATION ONLY

N HOT

A.C. SUPPLY POWER

FIELD WIRING

NOTES:

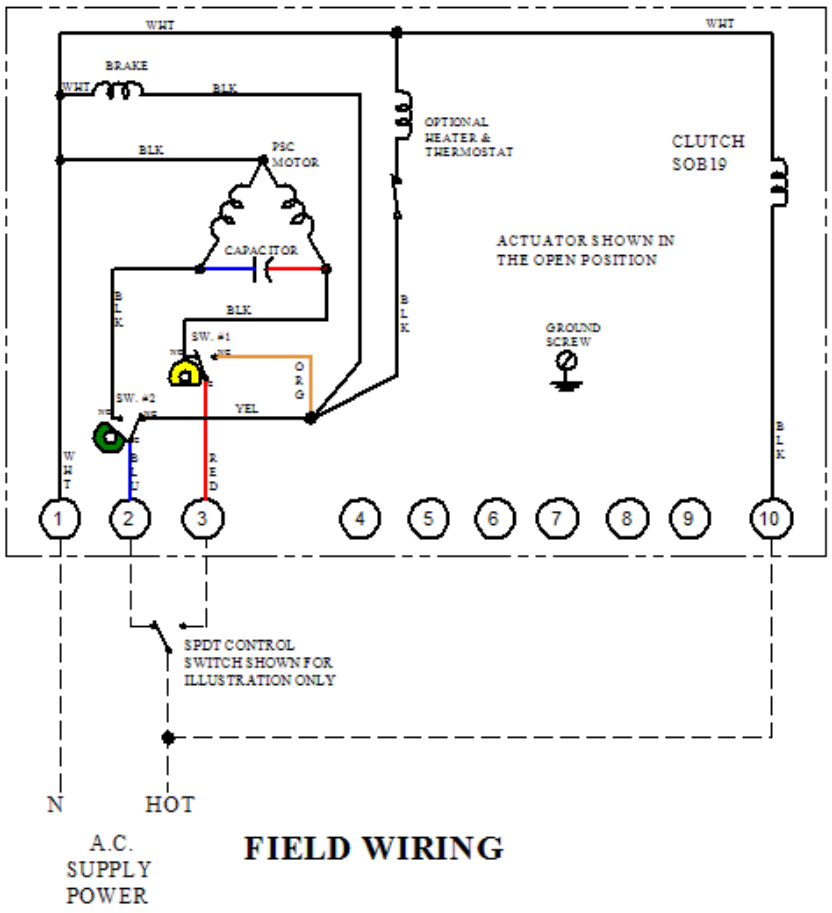
POWER TO TERMINALS ONE & TWO OPENS THE VALVE (CCW ROTATION)
POWER TO TERMINALS ONE & THREE CLOSES THE VALVE (CW ROTATION)
TERMINAL 4 SUPPLIES 120V POWER TO THE BRAKE ONCE THE ACTUATOR REACHES IT'S OPEN OR CLOSE POSITION. THE BRAKE WILL HOLD THE ACTUATOR IN THAT POSITION UNTIL POWER IS DELIVERED TO THE OPPOSITE DIRECTION.

LOSS OF SUPPLY POWER WILL SHUT OFF POWER TO THE BRAKE AND CAUSE THE ACTUATOR TO BE SPRING DRIVEN TO THE FAIL POSITION. UPON RETURN OF SUPPLY POWER THE ACTUATOR WILL AUTOMATICLY RETURN TO THE POSITION THE CONTROL SWITCH DESIGNATES.

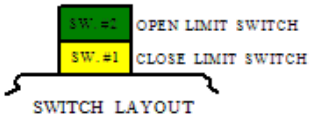
DO NOT MOTOR DRIVE THE ACTUATOR INTO MECHANICAL STOP. OUTPUT PINION WILL BE DAMAGED.

THIS IS A FAIL-SAFE ACTUATOR - DO NOT USE IN CONTROL TYPE APPLICATIONS

STANDARD 115VAC ES2 & AS SERIES WIRING DIAGRAM



FIELD WIRING



NOTES:
POWER TO TERMINALS ONE & TWO OPENS THE VALVE (CCW ROTATION)
POWER TO TERMINALS ONE & THREE CLOSES THE VALVE (CW ROTATION)

LOSS OF SUPPLY WILL SHUT OFF POWER TO THE CLUTCH AND CAUSE THE ACTUATOR TO BE SPRING DRIVEN TO THE FAIL POSITION. UPON RETURN OF SUPPLY POWER THE ACTUATOR WILL AUTOMATICLY RETURN TO THE POSITION THE CONTROL SWITCH DESIGNATES.

DO NOT MOTOR DRIVE ACTUATOR INTO MECHANICAL STOP, OUTPUT PINION WILL BE DAMAGED.

THIS IS A FAIL-SAFE ACTUATOR DO NOT USE IN CONTROL TYPE APPLICATIONS

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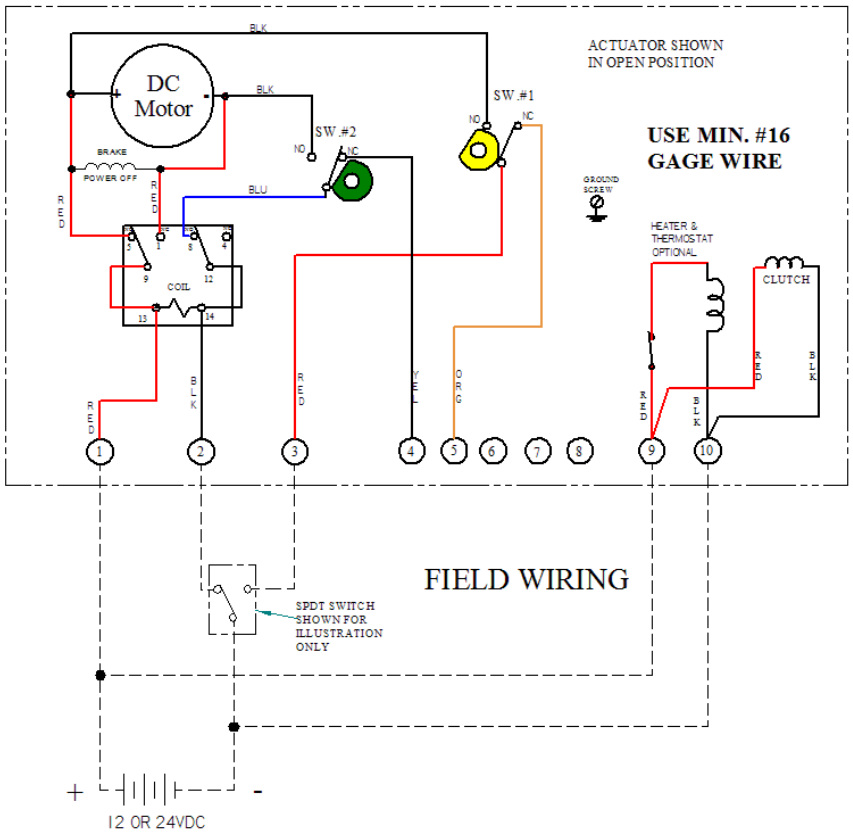
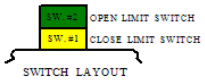
STANDARD 115VAC ASC SERIES WIRING DIAGRAM

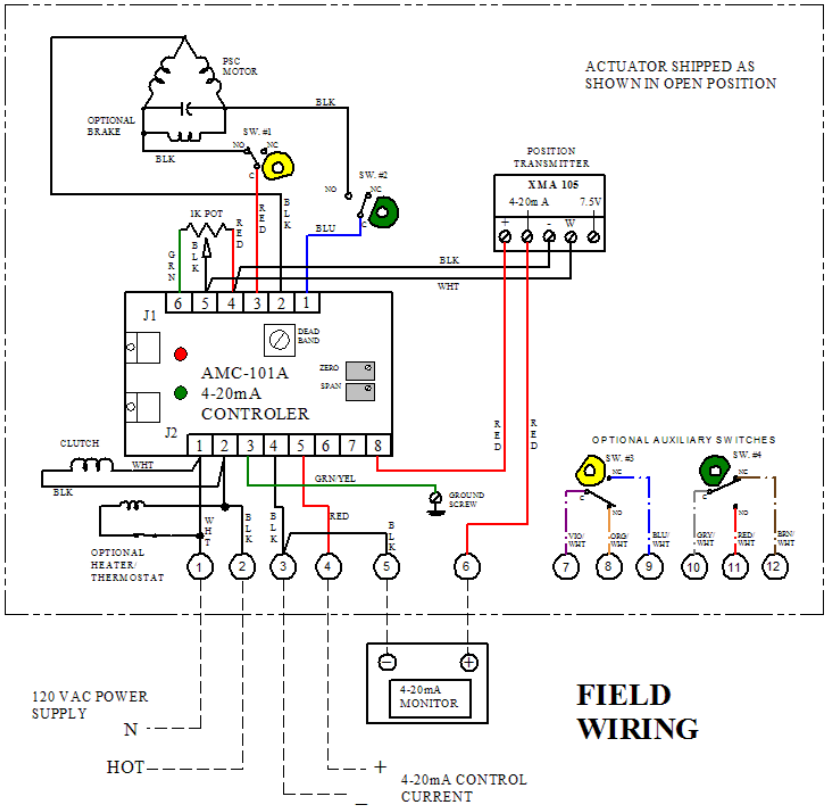


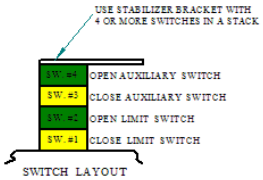


OPERATION:
POWER TO 1 & 2 FOR CCW ROTATION (OPEN)
POWER TO 1 & 3 FOR CW ROTATION (CLOSE)
TERMINALS 4 & 5 FOR LIGHT INDICATION
TERMINALS 9 & 10 FOR HEATER, THERMOSTAT & CLUTCH
RELAY TO BE 15A CONTACT RATED.

W110621

DC VOLTAGE ASC SERIES WIRING DIAGRAM





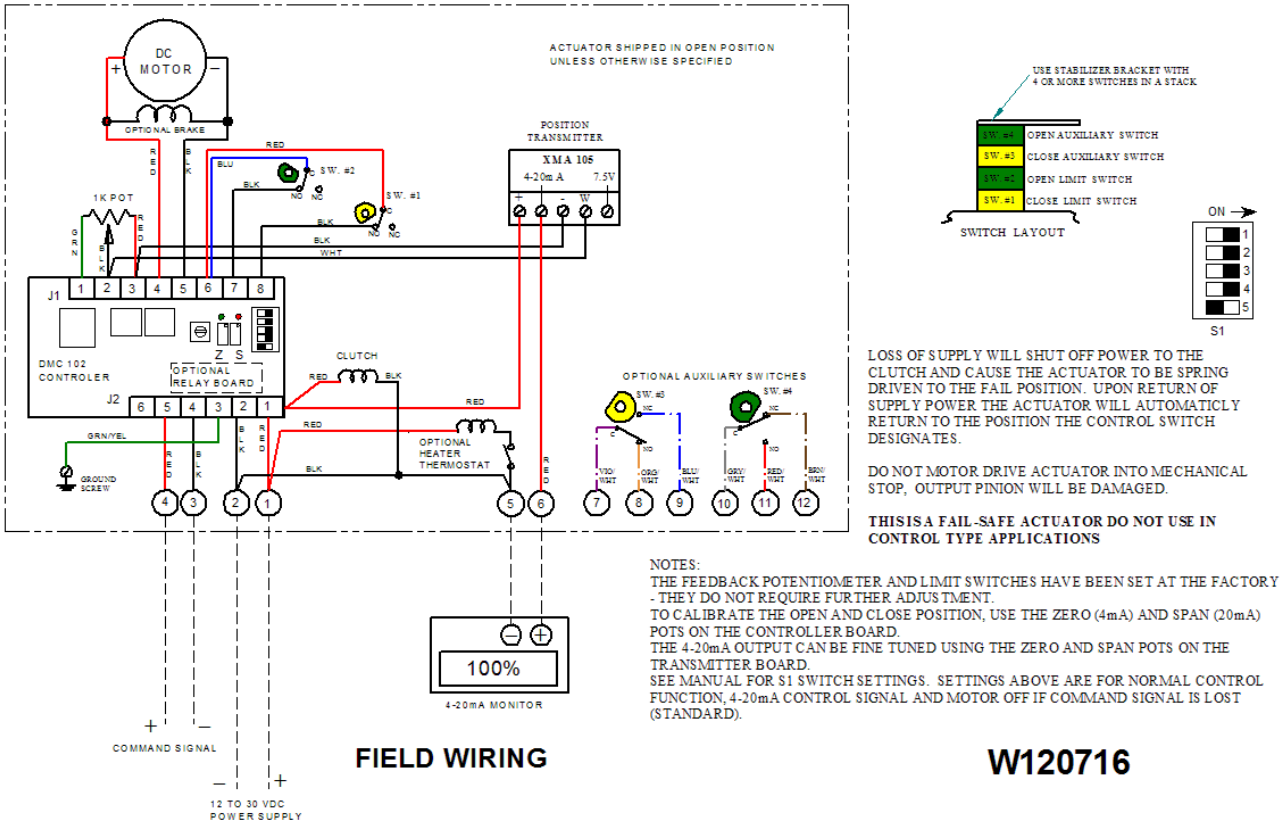
NOTE:
THE FEEDBACK POTENTIOMETER AND LIMIT SWITCHES HAVE BEEN SET AT THE FACTORY - THEY DO NOT REQUIRE FURTHER CALIBRATION.

TO CALIBRATE THE OPEN AND CLOSE POSITION USE THE TRIM POTS LABELED Z (ZERO) FOR CLOSE (4mA) AND S (SPAN) FOR OPEN (20mA).

115VAC POWER TO BE APPLIED ALL THE TIME - THIS POWERS AND ENGAGES THE MOTOR CLUTCH. WHEN POWER IS REMOVED, THE CLUTCH DIS-ENGAGES AND THE ACTUATOR WILL FAIL TO THE DESIRED POSITION.

W160624

115VAC ASC SERIES WITH 4-20MA POSITIONER WIRING DIAGRAM



LOSS OF SUPPLY WILL SHUT OFF POWER TO THE CLUTCH AND CAUSE THE ACTUATOR TO BE SPRING DRIVEN TO THE FAIL POSITION. UPON RETURN OF SUPPLY POWER THE ACTUATOR WILL AUTOMATICLY RETURN TO THE POSITION THE CONTROL SWITCH DESIGNATES.

DO NOT MOTOR DRIVE ACTUATOR INTO MECHANICAL STOP, OUTPUT PINION WILL BE DAMAGED.

THIS IS A FAIL-SAFE ACTUATOR DO NOT USE IN CONTROL TYPE APPLICATIONS

NOTES:
THE FEEDBACK POTENTIOMETER AND LIMIT SWITCHES HAVE BEEN SET AT THE FACTORY - THEY DO NOT REQUIRE FURTHER ADJUSTMENT.
TO CALIBRATE THE OPEN AND CLOSE POSITION, USE THE ZERO (4mA) AND SPAN (20mA) POTS ON THE CONTROLLER BOARD.
THE 4-20mA OUTPUT CAN BE FINE TUNED USING THE ZERO AND SPAN POTS ON THE TRANSMITTER BOARD.
SEE MANUAL FOR S1 SWITCH SETTINGS. SETTINGS ABOVE ARE FOR NORMAL CONTROL FUNCTION, 4-20mA CONTROL SIGNAL AND MOTOR OFF IF COMMAND SIGNAL IS LOST (STANDARD).

W120716

DC VOLTAGE ASC SERIES WITH 4-20MA POSITIONER WIRING DIAGRAM

CALIBRATION OF MODULATING MODEL:

The non-interactive zero and span adjustments of the modulating board allow for easy calibration once the unit is installed. Follow these steps to calibrate the unit:

1 - Apply power to the actuator, and set the command input signal to minimum: 0V for 0-10V input type 1V for 1-5V input type 4mA for 4-20mA input type.

2 - Adjust the "Zero" adjustment so that the actuator moves to the desired closed position. If the desired position cannot be achieved, check that the position potentiometer provides a feedback signal to the controller board; also, check the position of the CLOSE limit switch. Adjust the CLOSE cam CCW to allow for more travel in CLOSE position, if needed.

3 - If the actuator is hunting for position, turn the "Deadband" adjustment clockwise until hunting stops. If the actuator is not hunting for position, turn the "Deadband" adjustment counterclockwise until the actuator begins to hunt; then turn the "Deadband" adjustment slightly clockwise until hunting stops. **WARNING!** Actuator failure may occur if the "Deadband" adjustment is set to allow continuous hunting. This can cause excessive wear of motor bearings, gear train, dynamic brake, and position potentiometer. Hunting can also cause the internal temperature of the actuator housing to rise to a level that exceeds the maximum rating of the motor.

4 - Set the command signal input to maximum: 10V for 0-10V input type 5V for 1-5V input type 20mA for 4-20mA type.

5 - Adjust the "Span" adjustment so that the actuator moves to the desired open position. If the desired position cannot be achieved, check the position of the OPEN limit switch. Adjust the OPEN cam CW to allow for more travel in OPEN position, if needed.

NOTE: The "Zero" adjustment is an offset setting rather than an absolute setting. Should the "Zero" adjustment be changed, the "Span" adjustment should be checked for the desired open position. Setting of the "Span" adjustment has no effect on the "Zero" adjustment.

6 - To check proper operation and linearity, set the command signal to halfway: 5V for 0-10V input type 3V for 1-5V input type 12mA for 4-20mA input type. Verify that the actuator's position is midway between the open and closed positions.

MAINTENANCE:

After your ICI spring return 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 Shell Darina #2 grease.

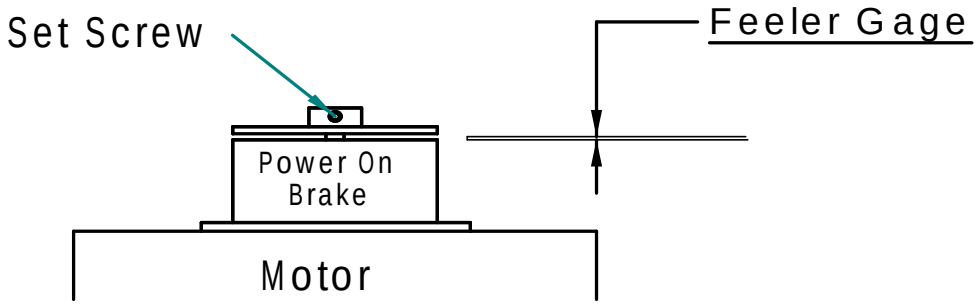
TO SET BRAKE:

If it is ever becomes necessary to set the brake:

1) Using a .050'' Allen wrench loosen the two setscrews in the brake disk hub

2) Using a feeler gage set the gap between the disk and stationary coil & field assembly to .015" +/- 0.005"

3) Secure the 2 set screws in the hub.



DUTY CYCLE:

ICI 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 overheating.

MECHANICAL OVER LOAD:

ICI' 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
- Part Description

RECOMMENDED SPARE PARTS:

Set of cams and switches (positioner board and potentiometer for modulating controls).

NEMA 7 ENCLOSURE, GENERAL:

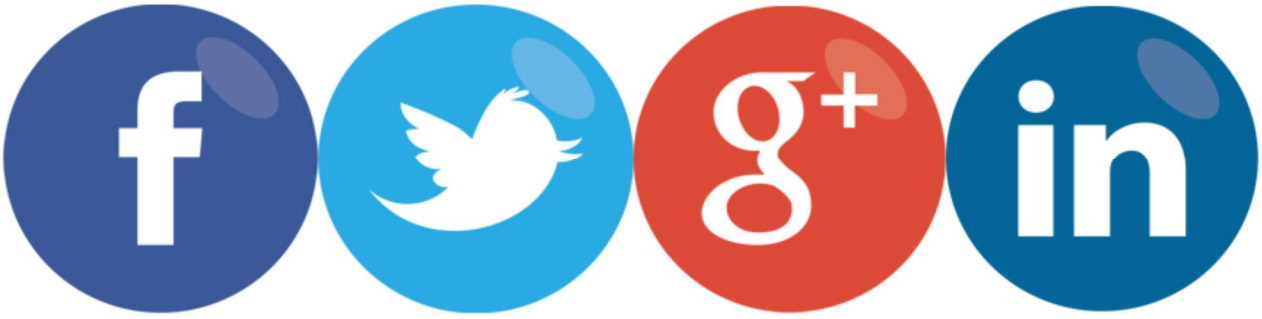
In general, operation and maintenance of a NEMA 7 electric actuator is no different than that of a NEMA 4 electric actuator. However, there are some precautions that must be followed.

1. **DO NOT** install in ambient temperatures that exceed 140 degrees F.
2. **DO NOT** under any circumstances remove the actuator cover while in a hazardous location when the contacts are still live, 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.*

Frequently Asked Questions

SYMPTOM	PROBLEM	SOLUTION
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. Bad Brake	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 Remove brake hub & try to run
Actuator Will Not Open or Close Completely.	Travel limits set wrong Valve torque too high for actuator Mechanical stops not removed	Reset cams. 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 ICI or nearest distributor



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