INDELAC Controls, inc.



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.	Actua	itor model number				
2.	Actuator enclosure type NEMA 4, NEMA 4X, NEMA 7, NEMA 4 & 7_					
3.	Actuator output thrustLB					
4.	Motor characteristics, VoltageHertzPhase					
5.	Actuator serial number					
6.	Date of installationPut into operation					
7. Valve Data:						
	7a.	Manufacturer				
	7b.	Style & fig. No				
	7c.	Size				
	7d.	End connection				
7e. Material of construction, Body		Material of construction, BodyStem & ball				
	7f.	Brake away torqueLB-IN @PSI				
	7g.	Other helpful data				
8.	Stroke	eIN.				
MED	IA:					
1.	System media					
2.	Temp	perature,(deg. F.) Maximum, Minimum,				
3.	PressurePSI					

*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					
Terminal strip screws					
Cam setscrew					
Mounting pad screws					

7/16" socket.3/16" wide flat head screw driver.5/64" Allen wrench (when equipped with limit switches).9/16" 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
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

DESCRIPTION:

ICI's actuator controller comes in various configurations to accommodate many applications. Basically two parameters should be considered in selecting the appropriate model for the application:

- 1. actuator motor current, and
- 2. operating voltage

ICI positioners are available in two current capacities, 2 amps and rated at 5 amps. The 2 amp controller is rated for 2A motors and is available for 117VAC, 234VAC, or 24VAC operation. ICI's 5 amp positioner is rated 5A for larger actuators and also comes in 117VAC, 234VAC, or 24VAC versions.

CAUTION! High voltages are present on the outside of the unit when power is applied. AC power should be disconnected prior to any wiring of these units.

A heater and thermostat should be used in applications where the temperature will drop below 0°F. A heater or breather should be used in application where condensation may occur.



POWER / SIGNAL (Terminal Block J2):

Power is connected to terminals 1, 2, and 3 (3 is ground) as shown in the wiring diagram below. The fuse installed on the unit is rated for maximum output current that can be safely delivered by the AC outputs. Replacement fuses must not exceed these maximum ratings (2A for the Positrol2 positioner and 5A for Positrol5 positioner) to prevent damage to the unit.

An appropriate command signal, 0-10V, 1-5V, or 4-20mA should be connected to terminal 5 or 6 (as shown in the wiring diagram) while using terminal 4 as the return *signal ground*. The positioner must be configured for the type of command signal that is to be used - jumper plug JP1 must be installed whenever a 4-20mA or 0-10V input is used. Terminal 7 of J2 provides an auxiliary +10V output, which can be used to connect a command potentiometer. By connecting one end of a potentiometer to terminal 7, the other end to terminal 4, and the wiper to terminal 6, a local control knob can be implemented. Terminal 8 provides an auxiliary +24VDC output, which can be used to power an input or output 4-20mA transmitter.

ACTUATOR (Terminal Block J1):

The actuator and feedback potentiometer are connected to terminal block J1 as shown in the wiring diagram. Terminal 1 should be connected to the motor winding that moves the actuator toward the open position, and conversely, terminal 3 is connected to the winding that moves the actuator toward the closed position. Terminal 2 is the neutral or common wire to the motor windings. The feedback potentiometer wiper must be connected to terminal 5 of J1. One end of the potentiometer is connected to terminal 4, and the other is connected to terminal 6. The potentiometer should be connected so that when the actuator moves towards the open position (CCW), the potentiometer's resistance between terminals 4 and 5 will increase. This can also be measured as a voltage - the voltage between terminals 4 and 5 should increase when the actuator moves towards the open position (CCW). If the potentiometer is wired incorrectly, the typical response of the unit will be to run the actuator to the full open or closed position (the appropriate open/close indicator will remain on) regardless of the command signal input. The feedback potentiometer should be mounted to provide a proper feedback signal through the entire range between the open and closed positions. For best results, position the actuator to the midway point between the open and closed positions; then adjust the feedback potentiometer for approximately 5VDC (or 1/2 of the potentiometer's resistance) between terminals 4 and 5 of J1. Since the feedback potentiometer is crucial for proper operation of the positioner, the following items should be carefully observed:

- 1- Potentiometer resistance should be a value from 1K to 10K ohms.
- 2- The potentiometer should be a linear taper type.
- 3- The potentiometer must be properly wired to provide the correct feedback signal.
- 4- The potentiometer must be properly and securely mounted in order to provide reliable feedback signal.



OUTPUT INDICATORS:

ICI's positioners have on-board indicators that identify when one of the motor outputs is turned on. When the open output is turned on, the red LED indicator will turn on, and when the close output is turned on the green LED indicator will turn on. Many actuators are equipped with limit switches at the *open* and *closed* positions which are intended to disconnect power to the motor to prevent mechanical damage. For this reason, it is possible that the positioner will indicate that one of the motor outputs is turned on when the actuator is not in motion. However, it should be noted that when the indicator is on, power is applied to the motor output.

LOSS OF INPUT SIGNAL:

When the 1-5V or 4-20mA type command signal is used, the positioner can detect that the input signal has been disconnected. The unit can be configured to respond to the loss of command signal in one of three ways: turn both outputs off (leaving the actuator in its last position at the time signal was lost), turn on the open output (to move the actuator to the full *open* position), or turn on the close output (to move the actuator to the full *open* position), or turn on the close output (to move the actuator). To select the desired response to a loss of input signal, install jumper plug JP2, JP3, or JP4 as shown in the wiring diagram. **CAUTION!** Power must be disconnected when installing or removing these jumpers - damage to the unit may occur if these jumpers are set with power on.

When using this feature, certain precautions should be observed. For applications using the 0-10V input signal, the unit **cannot** detect a loss of signal; **do not** install jumper plugs JP2, JP3, and JP4 for 0-10V applications. When JP3 or JP4 are installed, the unit will turn on one of the motor outputs when the input signal is lost; if the actuator does not use limit switches, these selections should not be used.

INSTALLATION:

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

- 1. Verify that the valve and actuator are in the same position. It may be necessary to remove parts that are no longer required by the valve when automated. Refer to the valve manufacturer's manual for detailed instructions.
- 2. Install mounting hardware on actuator and thread coupling into actuator drive shaft, do not tighten bolts securely at this time, mount valve to actuator, once valve screws have been started securely tighten all nuts and bolts. **NOTE:** Conduit entry is normally positioned perpendicular to pipe line.
- 3. Remove actuator cover.
- 4. Wire actuator using the wiring diagram inside cover. **CAUTION:** Be sure power is off at the main power box.
- 5. Turn on power to actuator. **CAUTION:** Use extreme caution, as there are live circuits that could cause electrical shock or death.
- 6. See calibration instructions below for detailed instructions.
- 7. Upon completion of calibration replace cover and secure cover screws.



CALIBRATION:

The non-interactive zero and span adjustments of the positioner allow for easy calibration once the unit is installed. After insuring that the feedback potentiometer and motor outputs are wired to provide a proper feedback signal, as described under "ACTUATOR (J1)", follow these steps to calibrate the unit (see wiring diagram for the location of the adjustments):

1 - Apply AC 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 feedback potentiometer provides a feedback signal as described under "ACTUATOR (J1)"; also, check the position of the limit switches.

3 - If the actuator is hunting for position, turn the "Dead band" adjustment clockwise until hunting stops. If the actuator is not hunting for position, turn the "Dead band" adjustment counterclockwise until the actuator begins to hunt; then turn the "Dead band" adjustment slightly clockwise until hunting stops. **WARNING!** Actuator failure may occur if the "Dead band" adjustment is set to allow continuous hunting. This can cause excessive wear of motor bearings, gear train, dynamic brake, and feedback potentiometer. Hunting can also cause the internal temperature of the actuator housing to rise to a level that exceeds the maximum rating of 60C.

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 limit switch.

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".



WIRING DIAGRAM 115Vac/1Ph ACTUATOR WITH 4-20mA CONTROL





WIRING DIAGRAM FOR 3Ph ACTUATORS WITH 4-20mA CONTROL





WIRING DIAGRAM FOR 3Ph ACTUATORS WITH HIGH RESOLUTION CONTROL





HIGH RESOLUTION CONTROL CALIBRATION:

This actuator has been set at the factory. If calibration is required after the valve is installed it is not necessary to set the potentiometer or limit switches (optional). When auxiliary switches (dry contacts) are supplied they may need to be adjusted for the application.

- 1. Connect three phase power L1, L2 AND L3 to terminals 1, 2 and 3.
- 2. Turn on power to actuator.
- 3. Push MODE button until yellow "MANUAL/FB POT" LED is illuminated. The LED may be flashing through the next several steps.
- 4. Push the up/down button to move the actuator and verify that the limit switches are set past the desired open/close position.
- 5. Operate the actuator to the mid position.
- 6. If the LED is solid (indicating that the potentiometer is in its mid position) proceed to step 8.
- 7. If the LED is flashing this indicates that the potentiometer is not at its mid-point (2.5K ohms on a 5K ohm potentiometer) loosen the set screw in the potentiometer drive shaft and slide the potentiometer up/down until the LED is no longer flashing and tighten set screw. **NOTE:** Actuators with indicators have the set screw located in the pointer of the indicator. Hint, the farther away from the potentiometers mid position the slower the LED will flash.
- 8. Push the MODE button until the "CLOSE" LED is illuminated. Use up/down buttons to drive the actuator to the desired position. If optional close limit has been supplied be sure it does not engage.
- 9. Push the MODE button until the "OPEN" LED is illuminated. Use the up/down buttons to drive the actuator to the desired position. If optional open limit has been supplied be sure it does not engage.
- 10. Push the MODE button until the "COMMAND" LED is illuminated. Push the up/down buttons to select the appropriate command signal, 4-20mA, 1-5Vdc, 0-5Vdc, 1-10Vdc or digital. If 0-5Vdc or 0-10Vdc is selected loss of command is not available. Move to step 12 if 0-5Vdc or 0-10Vdc is selected.
- 11. Push MODE button until "LOSS OF COMMAND" LED is illuminated. Use up/down button to select desired failure mode upon loss of command signal, stay in last position, drive open or drive close.
- 12. If the optional position transmitter is installed see "**POSITION TRANSMITTER**" instructions below, if not proceed to next step.
- 13. Press MODE button until "AUTO" LED is illuminated.
- 14. Actuator is now calibrated and ready for operation.

15. POSITION TRANSMITTER

- a. Press MODE button until the red "AUX POSITION OUT CAL" LED is illuminates while the "CLOSE LED" flashes. **NOTE:** the red LED flashes to indicate a "fault" and becomes steady to indicate "AUX POSITION OUT CAL" modes.
- b. Use the up/down buttons to set the desired output voltage of current (mA) on the option module output for the close position.
- c. Push the MODE button so the "AUX POSITION OUT CAL" LED remains steady while the "OPEN" LED flashes. U se the up/down buttons to set the desired output voltage or current (mA) on the option module output for the open position.
- d. Proceed to stem 13 above.

MAINTENANCE:

After your ICI 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:

ICI's 12 Series actuators are equipped with 75% or 100 % duty cycle motors depending on the thrust of the actuator.

INDE

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:

Linear potentiometer and positioner card are recommended for critical applications:



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°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.
- 8. **WARNING!** To prevent ignition of hazardous atmospheres conduit runs must have a sealing fitting within 18" of this enclosure

*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.







SYMPTOM	PROBLEM	SOLUTION
ACTUATOR DOES NOT RESPOND		
TO CONTROL SIGNAL.	Power not on Actuator wired wrong Wrong voltage	Turn on power Check wiring diagram & rewire Check power supply & make appropriate changes
	Thermal overload activated	Allow motor to cool, actuator will automatically reset
	Actuator and valve in opposite positions when actuator was mounted.	Remove actuator and rotate 90 degrees & remount
	Torque trip point set too low	Increase trip point
	Torque trip delay set too short	Increase delay time
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
	Torque trip point set too low	Increase trip point
	Torque trip delay set too short	Increase delay time
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



NOTES



Contact Information

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