

INDELAC

CONTROLS, INC.

DC MODULATING ELECTRIC ACTUATORS

Installation Operation & Maintenance Manual

All Modulating DC Voltage Electric Actuators Models

Additional supplements may be required for selected optional equipment including, but not limited to models with: timers, speed controllers, remote/off/local controls, and external battery backup systems.

REV 12.2020

TELEPHONE: +1-859-727-7890
TOLL FREE: +1-800-662-9424
FAX: +1-859-727-4070
SHIPPING ADDRESS: 6810 POWERLINE DR. FLORENCE, KY. 41042

**TO ACCESS ICI PRODUCT MANUALS, WIRING DIAGRAMS, DATASHEETS, 2D/3D DIMENSIONAL DRAWINGS, TRAINING VIDEOS, OR TO REQUEST ADDITIONAL SUPPORT VISIT OUR WEBSITE
WWW.INDELAC.COM**

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___
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 FASTENERS USED WHEN MOUNTING THE ACTUATOR.**

R SERIES

Cover Screws	9/64" Allen Wrench.
Terminal Strip Screws	1/8" Wide Flat Head Screwdriver.
Cam Set Screw	5/64" Allen Wrench.
Mounting Pad Screws	3/8" Socket.

S SERIES

Cover Screws	SD, Phillips Head Screwdriver, Deep Base, 9/64 Allen Wrench, NEMA 7 Enclosure, 7/16" Socket.
Position Indicator	5/64" Allen Wrench.
Terminal Strip Screws	1/8" Wide Flat Head Screwdriver.
Cam Set Screw	5/64" Allen Wrench.
Mounting Pad Screws	3/8" Socket.

M SERIES

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	1/2" Socket.

L SERIES

Cover Screws	7/16" Socket.
Terminal Strip Screws	3/16" Wide Flat Head Screwdriver.
Cam Set Screw	5/64" Allen Wrench.
Mounting Pad Screws	9/16" Socket.

K SERIES

Cover Screws	1/2" Socket.
Position Indicator	5/64" Allen Wrench.
Terminal Strip Screws	3/16" Wide Flat Head Screwdriver.
Cam Set Screw	5/64" Allen Wrench.
Mounting Pad Screws	3/4" 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

INSTALLATION:

- PLEASE REFER TO THE **TOOLS REQUIRED** SECTION ON PAGE 3 PRIOR TO 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.

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. Begin the mounting process with the valve side first. Install mounting hardware on valve, do not tighten bolts securely at this time.
5. Continue the mounting process with the actuator side next. Place the actuator on top of the valve or mounting bracket and begin to install the actuator's mounting hardware. Once the bolts begin to thread into the holes on the mounting pad of the actuator it is now okay to securely tighten all nuts and bolts.
NOTE: ACTUATOR CONDUIT ENTRY IS NORMALLY POSITIONED PERPENDICULAR TO PIPELINE.
6. Remove actuator cover.
NOTE: WHEN REMOVING THE COVER ON NEMA 7 ACTUATORS, DO NOT DAMAGE THE GASKET OR THE NEMA 7 FLAME PATH BY PRYING THE COVER OPEN.
7. **CAUTION:** BE SURE POWER IS OFF AT THE MAIN POWER BOX.
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.
8. Turn on power to actuator.
CAUTION: USE EXTREME CAUTION, AS THERE ARE LIVE CIRCUITS THAT COULD CAUSE ELECTRICAL SHOCK OR DEATH.
9. Operate the valve to the close position. Check the alignment & adjust the Positioner board ZERO potentiometer & cams if necessary.
10. Operate the valve to the open position. Check the alignment & adjust the Positioner board SPAN potentiometer & cams if necessary.
NOTE: ICI ACTUATORS ARE FACTORY CALIBRATED, BUT ADDITIONAL FIELD CALIBRATION CAN BE REQUIRED TO ENSURE OPTIMAL PERFORMANCE IN YOUR APPLICATION. (REFER TO PAGE 11-13 FOR MORE DETAILED CALIBRATION INSTRUCTIONS)
11. 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.
12. Replace cover and secure cover screws.

VALVE POSITIONER DESCRIPTION:

ICI's valve positioner is used for proportional control of our complete line of DC electric actuators. An external command signal of 0-10V, 1-5V, or 4-20mA can be used to precisely position the actuator. Constant DC power is required to run the motor. With a loss of command signal in the 1-5V or the 4-20mA input range, the board offers three useful "loss of signal" positioning options: fail in place, fail to the open position, or fail to the closed position. All input and output options are field configurable with on board DIP switches. The only other adjustments consist of Deadband and non-interactive Zero and Span trim potentiometers, which allows for easy field calibration. This controller is operational from 10-30VDC power and gives the user isolation between the input control signal and the DC power. The unit includes a red LED indicator (indicates travel toward open position), a green LED indicator (indicates travel towards closed position), and two removable screw terminal strips (for easy servicing). Note: the mounting bracket is required for heat sinking the positioner board.

ADDITIONAL FEATURES:

- Multiple units are easily connected in parallel to a common command signal.
- Built-in utility power supply for powering a command pot.
- No external motor resistors are required.

MANUAL OVERRIDING A MODULATING ACTUATOR:

The actuator is calibrated at the factory for 90° OPEN & CLOSE using the user specified input signal. Therefore, the position potentiometer is specially set for the unit based on this travel. If this potentiometer is moved either by loosening the set screw or **manually overriding the actuator**, recalibration is **required**!

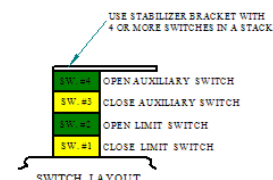
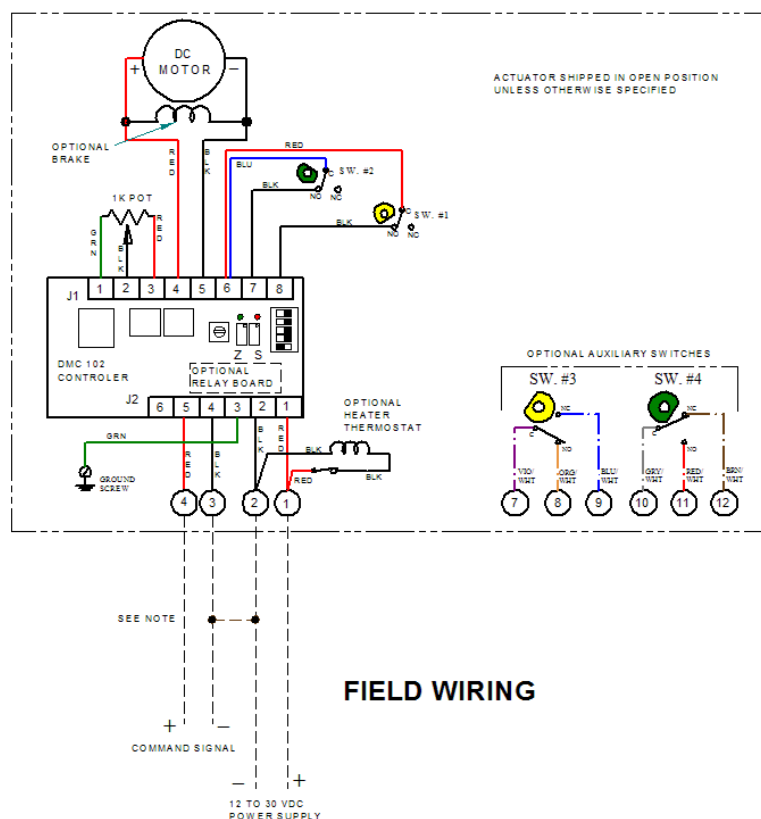
The actuator is shipped in the OPEN position, so try to avoid manually overriding the actuator when assembling to the valve. If this occurs, follow the recalibration step in this manual.

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.

CUSTOMER ELECTRICAL CONNECTIONS:

WIRING DIAGRAM: W970109T
DESCRIPTION: 12/24VDC MODULATING ACTUATOR
OPTIONS SHOWN: 2 AUXILIARY SWITCHES
 MOTOR BRAKE
 HEATER AND THERMOSTAT



SPECIFICATIONS

POWER REQUIREMENTS:
 Operating voltage....10 to 30 VDC

DC MOTOR OUTPUTS:
 Maximum locked rotor current = 60A
 Full Load Amps = 10A

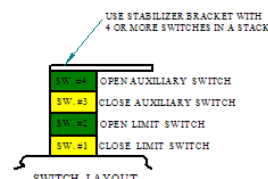
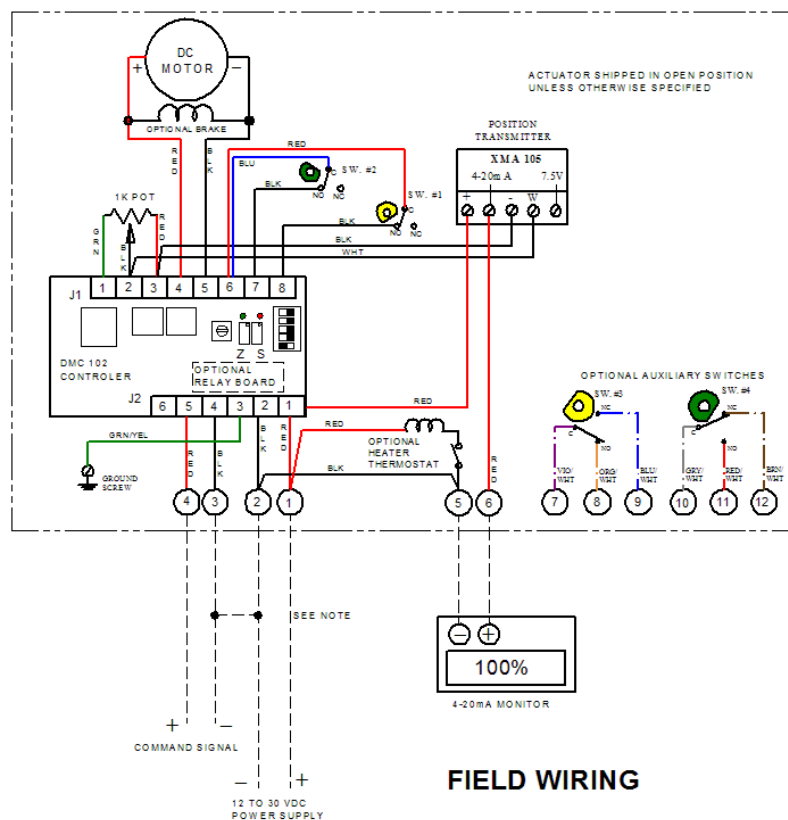
SD DEEP BASE UNIT REQUIRES THAT THE RED AND GREEN POTENTIOMETER WIRES BE REVERSED; RED - J1-1 & GREEN - J1-3.

NOTES:
 FEEDBACK POTENTIOMETER AND LIMIT SWITCHES ARE PRESET AT THE FACTORY AND DO NOT REQUIRE ADJUSTMENT.
 ADJUST THE OPEN AND CLOSE OF THE VALVE USING THE ZERO (4mA) AND SPAN (20mA) POTS ON THE CONTROLLER BOARD.
 THE 4-20mA OUTPUT CAN BE ADJUSTED 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).
THE USER IS REQUIRED TO MAKE SURE THAT THE DC POWER GROUND (-) AND THE CONTROL SIGNAL GROUND (-) ARE TIED TOGETHER.

W970109T

CUSTOMER ELECTRICAL CONNECTIONS:

WIRING DIAGRAM: W90911
DESCRIPTION: 12/24VDC MODULATING ACTUATOR WITH POSITION FEEDBACK,
OPTIONS SHOWN: 2 AUXILIARY SWITCHES
 MOTOR BRAKE
 HEATER AND THERMOSTAT



SPECIFICATIONS

POWER REQUIREMENTS:
Operating voltage...10 to 30 VDC

DC MOTOR OUTPUTS:
Maximum locked rotor current = 60A
Full Load Amps = 10A



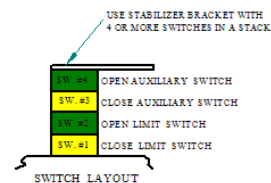
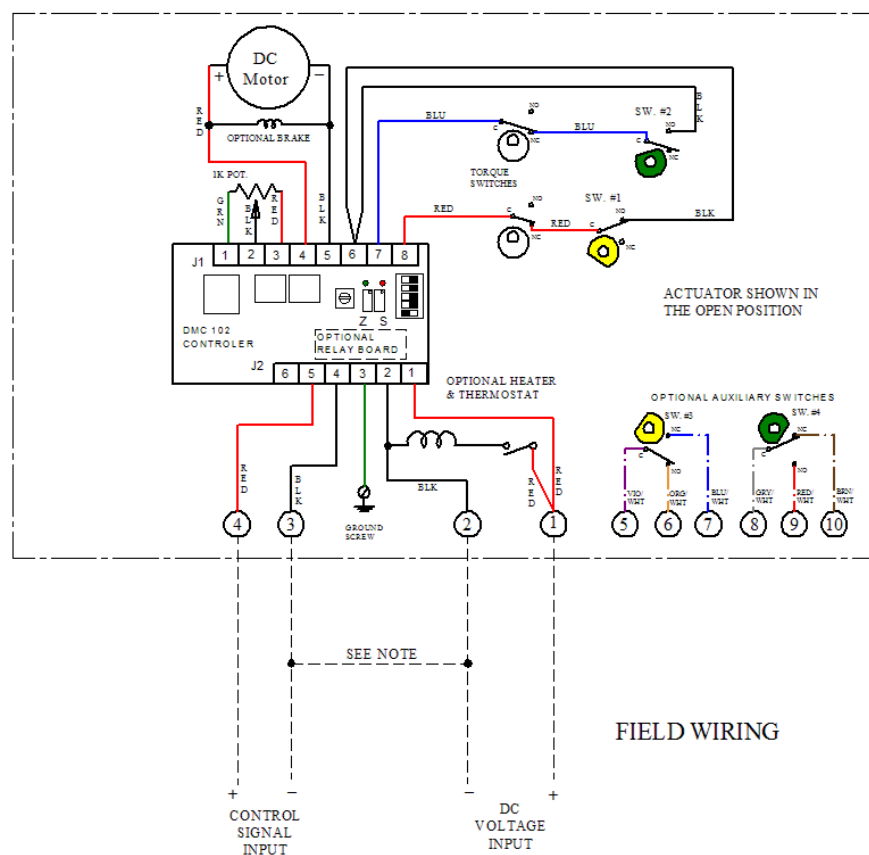
NOTES:
THE FEEDBACK POTENTIOMETER AND LIMIT SWITCHES HAVE BEEN SET AT THE FACTORY - THEY DO NOT REQUIRE FURTHER ADJUSTMENT.
TO CALIBRATE THE OPEN AND CLOSE POSITION, USE THE ZERO (4mA) AND SPAN (20mA) POTS ON THE CONTROLLER BOARD.
THE 4-20mA OUTPUT CAN BE FINE TUNED USING THE ZERO AND SPAN POTS ON THE 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).
THE USER IS REQUIRED TO MAKE SURE THAT THE DC POWER GROUND (-) AND THE CONTROL SIGNAL GROUND (-) ARE TIED TOGETHER.

FIELD WIRING

W090911

CUSTOMER ELECTRICAL CONNECTIONS:

WIRING DIAGRAM: W030318
DESCRIPTION: 12/24VDC MODULATING K-SERIES ACTUATOR
OPTIONS SHOWN: 2 AUXILIARY SWITCHES
 MOTOR BRAKE
 HEATER AND THERMOSTAT (OPTIONAL)



SPECIFICATIONS

POWER REQUIREMENTS:
 Operating voltage....10 to 30 VDC
DC MOTOR OUTPUTS:
 Maximum locked rotor current = 60A
 Full Load Amps = 10A



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).
THE USER IS REQUIRED TO MAKE SURE THAT THE DC POWER GROUND (-) AND THE CONTROL SIGNAL GROUND (-) ARE TIED TOGETHER.

W030318

POWER / SIGNAL (J2):

Power is connected to the input terminals as shown in the wiring diagrams on the previous pages. The controller board is capable of delivering up to 10A continuous motor power AND up to 60A Locked Rotor Current. There is an on-board fuse, but it is not replaceable in the field.

An appropriate command signal should be connected to the input terminals (as shown in the wiring diagram). The positioner must be configured for the type of command signal that is to be used by setting the appropriate DIP switches (see configuration below). Terminal 6 of J2 provides an auxiliary +5V output, which can be used to connect a command potentiometer. By connecting one end of a potentiometer to terminal 6, the other end to terminal 4, and the wiper to terminal 5, a local control knob can be implemented. Terminal 4 will also need to be connected to Power Ground for this application.

WARNING! Verify that the unit is properly grounded for safety.

S1

COMMAND INPUT SIGNAL CONFIGURATION

COMMAND TYPE	SW1	SW2	SW3	SW4	LOSS OF COMMAND OPERATION
4-20mA	ON	ON	ON	ON	Motor off
			ON	OFF	Close (Zero setting)
			OFF	ON	Open (Span setting)
1-5V	OFF	ON	ON	ON	Motor off
			ON	OFF	Close (Zero setting)
			OFF	ON	Open (Span setting)
2-10V	OFF	OFF	ON	ON	Motor off
			ON	OFF	Close (Zero setting)
			OFF	ON	Open (Span setting)
0-5V	OFF	ON	OFF	OFF	NA
0-10V	OFF	OFF	OFF	OFF	NA

NOTE: All other settings are not valid and can cause abnormal operation.

CONTROL FUNCTION	SW5
Normal	OFF
Log Rate	ON

ACTUATOR (J1):

The position potentiometer is connected so that when the actuator moves towards the open position (CCW), the potentiometer's resistance between terminals 2 and 3 of J1 on the board, will increase. This can also be measured as a voltage - the voltage between terminals 2 and 3 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. For best results, position the actuator to the midway point between the open and closed positions; then adjust the position potentiometer for approximately 5VDC (or 1/2 of the potentiometer's resistance) between terminals 2 and 3 of J1. Since the position potentiometer is crucial for proper operation of the modulating board, the following items should be carefully observed:

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

OUTPUT INDICATORS:

ICI's modulating units 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. These switches set points need to be set just out of the range of OPEN and CLOSE range, so that the switch will NOT trip prior to reaching the desired full OPEN or full CLOSE positions. If the limit switch/es trip prior to reaching the OPEN or CLOSE position, one or more of the LEDs will begin flashing. See chart below. If one of the motor output LEDs is flashing and the motor is not turning, see the **CALIBRATION** section below.

GRN	RED	CONDITION
-	ON	MOTOR 1 on (+)
ON	-	MOTOR 2 on (+)
-	flash	LIMIT SW1 disconnected
flash	-	LIMIT SW2 disconnected
blink	OFF	Feedback WIPER < 0.25V
OFF	blink	Feedback WIPER > 4.75V
blink	blink	Low Battery Voltage
ON	ON	Overvoltage

LOSS OF INPUT SIGNAL:

When the 1-5V or 4-20mA type command signal is used, the modulating board can detect if the input signal has been disconnected. The unit can be configured to respond to the loss of command signal in one of three ways: (1) turn both outputs off (leaving the actuator in its last position at the time signal was lost), (2) to move the actuator to the full open position, (3) to move the actuator to the full closed position. DC power must be present for the actuator to fail open or fail closed. To select the desired response to a loss of input signal, configure the DIP switches as shown in the chart on PAGE 9. **CAUTION! Power must be disconnected when configuring these switches - damage to the unit may occur if these switches are set with power on.**

NOTE: FOR APPLICATIONS USING THE 0-10V INPUT SIGNAL:
THE UNIT CANNOT DETECT A LOSS OF SIGNAL - SET SW#3 AND SW#4 FOR OFF.

CALIBRATION:

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 (see board diagram on page 13 for the location of the adjustments):

1. Apply DC 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 potentiometer 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 as described under "ACTUATOR (J1)"; also, check the position of the CLOSE limit switch. Adjust the CLOSE cam 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" pot 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 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 should have 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.

REVERSE ACTING CALIBRATION (4mA = open & 20mA =closed):

The ZERO and SPAN adjustments can be set to any position within the feedback potentiometer's range, so Reverse Acting applications do not require any wiring changes. When delivering a 4mA signal, adjust the ZERO pot to the valve's full OPEN position. Then, deliver a 20mA signal and adjust the SPAN pot to the valve's full CLOSE position. If using a different control signal other than 4-20mA, deliver the appropriate signal and adjust as described above.

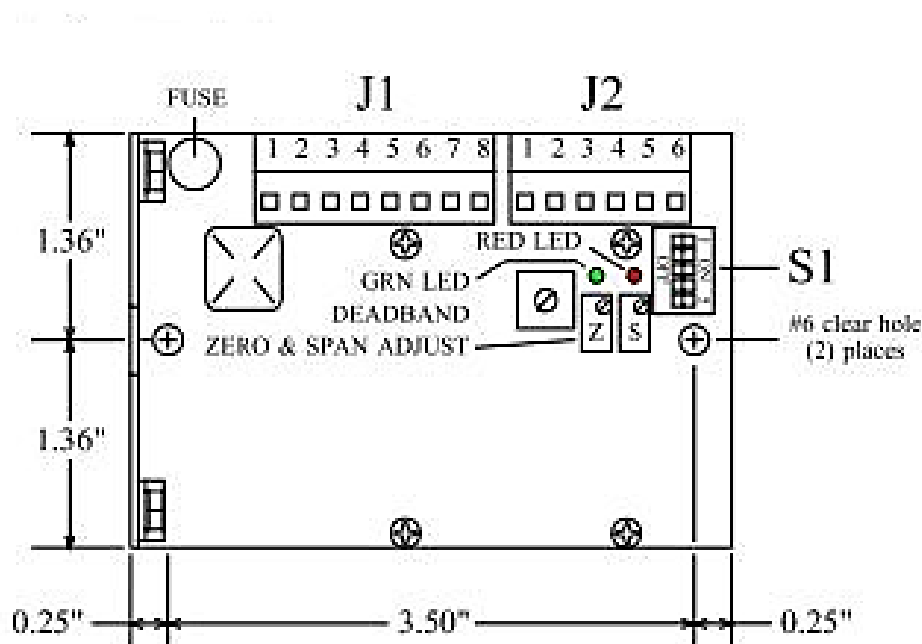
RECALIBRATION OF MODULATING BOARD

1. Move motor and valve to 45° or mid-position between open and close.
2. Loosen set screw on the potentiometer shaft gear.
3. Turn power to the actuator OFF so that the motor does not move.
4. Pull the 8-terminal J1 green connector out away from the controller board so that the potentiometer is isolated from the circuit card.
5. Using a DVM, measure the resistance of the potentiometer between terminals 2 & 3 at the free hanging J1 connector.
6. Rotate the potentiometer shaft gear until the resistance reads approximately 500 ohms (+/-10).
7. Tighten down the potentiometer shaft gear set screw to lock the gear in place.
8. Push the green J1 connector back into the controller board.
9. Connect a User Control Signal (4-20mA, 0-10v, etc.) to the actuator input terminals. Consult your actuator's wiring diagram for the proper (+) and (-) terminal connections.
10. Cut the wire tie from around the motor and carefully pull the Red motor wire and connector off the "+" motor terminal. Pull aside so that it does not make contact with the motor or any metal parts.
11. Set the User Control Signal to the CLOSE level (0%) - 4.0mA or 0V.
12. Make sure the Deadband pot on the controller board is at mid position.
13. Turn the DC power back ON to the actuator. Use **CAUTION** with the next few steps because power is present, and an electrical shock is possible.
14. Verify that both CAMs are pressing the switch levers in towards the switch bodies.
15. The Green LED on the board should come on. If not, adjust the Zero Pot until the Green LED illuminates.
16. If any of the LEDs are blinking or flashing or there is a question regarding the setup of the Command Signal Configuration Switches, please see the Output Indicator Section (page 10).
17. Connect and lightly hold the Red motor wire onto the "+" motor terminal so that the valve moves in the CLOSE direction.
18. When the valve reaches the fully CLOSED position, remove the Red motor wire to stop the motor. If the valve does not reach the fully CLOSED position on the first adjustment, keep adjusting the Zero Pot until full travel is reached.
19. Adjust the Zero Pot so that both the Green and Red LEDs are OFF.
20. Verify that the CLOSE CAM engages the switch lever so that it is pressed in.

RECALIBRATION OF MODULATING BOARD CONTINUED

21. With the Red motor wire still removed from the "+" motor terminal, set the User Control Signal to the OEPN level (100%) - 20.0mA or 10V.
22. The Red LED should turn on.
23. Connect and lightly hold the Red motor wire onto the "+" motor terminal so that the valve moves in the OPEN direction.
24. When the valve reaches the fully OPEN position, remove the Red motor wire to stop the motor. If the valve does not reach the fully OPEN position on the first adjustment, keep adjusting the Span Pot until full travel is reached.
25. Adjust the Span Pot so that both the Green and Red LEDs are OFF.
26. Verify that the OPEN CAM engages the switch lever so that it is pressed in.
27. Reconnect the Red motor wire to the "+" motor terminal and make sure that it is fully seated on the terminal. Install a new wire tie to hold the motor leads from becoming disconnected.
28. Deliver OPEN, MID and CLOSE (0%, 50% & 100%) Control Signals a few times to verify that the valve travels to the proper positions. Adjust as described above if further adjustments are needed.
29. Turn OFF the DC Power and check that all the set screws are tightened. Replace the actuator cover and tighten the screws.
30. Re-apply the DC power to the actuator.

MODULATING BOARD DIMENSIONS:



SPECIFICATIONS

POWER REQUIREMENTS:

10 to 30VDC

82mA Typical Operating Current

Fuse Type: 10A TR5 (non-replaceable)

COMMAND SIGNAL INPUT:

DC Voltage Input

Input Impedance: 13K ohms

Loss of Command Signal Threshold: <0.75V

4-20 mA Input

Input Impedance: 250 ohms $\pm 1\%$

Loss of Command Signal Threshold: <3mA

FEEDBACK SIGNAL INPUT:

Input Voltage: 0 to 5 VDC

External Feedback Potentiometer: 1K ohms

POWER SUPPLY OUTPUTS:

Command Signal Potentiometer Power: (J2-6): 5VDC @ 5mA max

NOTE: Do not connect this output to other power supplies.

DC MOTOR OUTPUTS:

Maximum Load Current = 10A

Maximum Locked Rotor Current = 60A

CONTROL ADJUSTMENTS:

Zero: adjustable throughout feedback signal range

Span: adjustable throughout feedback signal range

Deadband: 6mV to 118mV of feedback signal

ENVIRONMENTAL:

Operating Temperature Range: 0 °C to 60 °C

Storage Temperature Range: -40 °C to 85 °C

Relative Humidity Range: 0 to 90% (non-condensing)

SET AUXILIARY SWITCHES:

Read these instructions completely before making modifications to factory settings, if you have any questions please call our service technician at 1-800-662-9424 for assistance.

TOOLS REQUIRED:

- | | | |
|-------------------|---|---------------------------|
| 1. COVER REMOVAL | - | PHILLIPS HEAD SCREWDRIVER |
| 2. CAM ADJUSTMENT | - | 5/64" ALLEN WRENCH |

1. Turn off power supply to actuator.
2. Remove screws securing cover to gearbox, remove cover.
3. Turn on power to actuator.
CAUTION: AT THIS TIME THERE ARE LIVE CIRCUITS IN THE ACTUATOR; CONTACT MAY CAUSE ELECTRICAL SHOCK OR DEATH.
4. Operate actuator to the close position.
5. Rotate the third cam up from the base CCW so the setscrew is accessible, and the round of the cam has switch arm compressed.
6. Rotate the cam CW until the switch snap from the NO to the NC contact & switch arm moves away from switch body.
7. Lock cam in position by securing 8-32 x 1/4" long set screw to shaft.
8. Operate actuator to the open position.
9. Rotate top cam CW so set screw is accessible and round of cam has switch arm compressed.
10. Rotate top cam CCW until the switch snaps from the NO to the NC contact & switch arm moves away from switch body.
11. Lock cam in position by securing 8-32 x 1/4" long set screw to shaft.
12. Test setting to assure proper operation using Digital Volt Meter to check for proper switch closure.
13. If desired setting has not been achieved repeat steps 2 through 11.
14. Once proper settings have been accomplished replace cover and secure cover screws.
15. The Cam set positions for the Auxiliary Switches will be slightly different than the standard Open and Close Cams – the Open and Close Cams should be pushing in the switch levers at all times and in both open and close positions.

CHECK POWER OFF BRAKE:

Read these instructions completely before making modifications to factory settings, if you have any questions please call our service technician at 1-800-662-9424 for assistance.

TOOLS REQUIRED:

- | | |
|-----------------------|--|
| 1. 5/32" ALLEN WRENCH | 3. 3/16" WIDE FLAT SCREWDRIVER |
| 2. 0.050 ALLEN WRENCH | 4. PHILLIPS HEAD SCREWDRIVER (SD SERIES) |

Steps to be completed if the actuator will not move when a control signal is delivered and the brake is suspected to be defective!

1. Turn off supply power to actuator.
2. Remove screws securing cover to gearbox, remove cover.
3. Using .050 Allen wrench loosen setscrew in brake armature hub to motor shaft.
4. Pull up center hub to remove from brake & motor shaft.

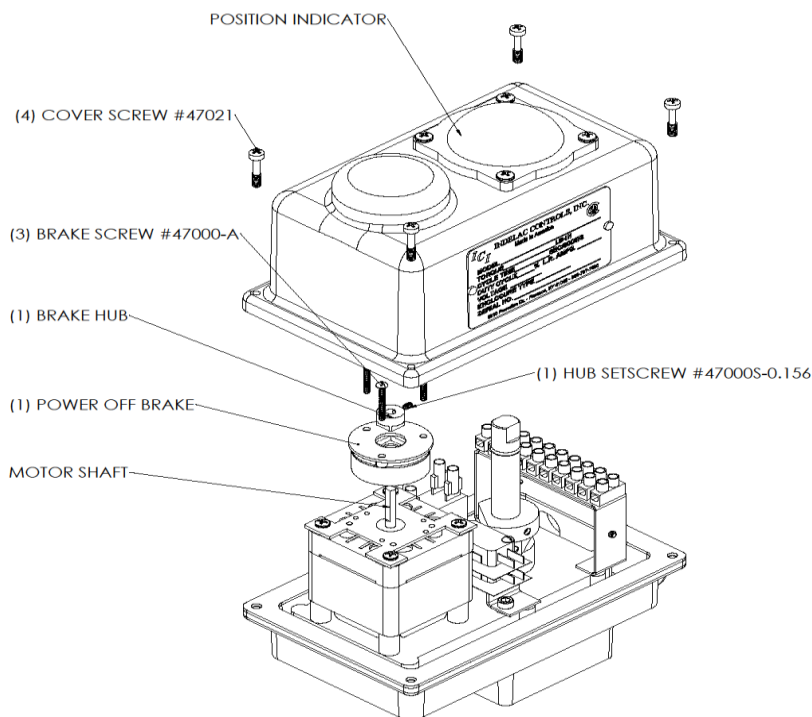


FIG. 1

5. Turn supply power on.
CAUTION: AT THIS TIME THERE ARE LIVE CIRCUITS IN THE ACTUATOR; CONTACT MAY CAUSE ELECTRICAL SHOCK OR DEATH.
6. Deliver an Open or Close signal to the actuator and the motor shaft should rotate.
7. If actuator runs, brake is bad and should be replaced.

DUTY CYCLE:

All direct current (DC) motors are rated for 75% duty cycle or greater.

THERMAL OVER LOAD:

24VDC 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, switches, feedback potentiometer and a modulating board.

AUXILIARY SWITCH CONTACT RATINGS:

The Snap Action Auxiliary Switches are SPDT and the contacts are rated for **15 Amps @ 250 VAC**.

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.*

MANUAL REVISIONS

MAY 13, 2020	ADDED ELECTRICAL SPECIFICATIONS FOR AUXILARY SWITCHES / CONTACT CURRENT
SEPT 11 2020	REFORMATTED CONTENT, UPDATED TROUBLESHOOTING, WARRANTY, COVER
DEC 16 2020	PAGE # UPDATES & CLARIFICATION OF CALIBRATION STEPS

INDELAC CONTROLS INC.

AMERICAN MADE ACTUATORS & CONTROLS



QUARTER-TURN ELECTRIC ACTUATOR WARRANTY POLICY:

THANK YOU FOR PURCHASING AN INDELAC CONTROLS, INC. (ICI) PRODUCT. IF YOU HAVE ANY QUESTIONS REGARDING THE PROPER INSTALLATION, USE, OR MAINTENANCE OF THE PRODUCT(S) PLEASE CALL US AT +1-859-727-7890. WE ARE COMMITTED TO KEEPING YOU SATISFIED.

ICI WARRANTS THAT FOR A PERIOD OF 24 MONTHS FROM THE DATE OF SHIPMENT IT WILL EITHER REPAIR OR REPLACE, AT ITS DISCRETION, THE PRODUCT(S) WHICH PROVE TO BE DEFECTIVE IN MATERIAL OR WORKMANSHIP. NO OTHER WARRANTY IS INCLUDED IN THIS EXTENDED WARRANTY. ICI'S SOLE LIABILITY IN CONNECTION WITH THE USE OF ITS PRODUCTS SHALL BE THE PRODUCTS' REPAIR OR REPLACEMENT.

THIS EXTENDED WARRANTY DOES NOT COVER DAMAGE TO, OR FAILURE OF THE PRODUCT RESULTING FROM CAUSES SUCH AS DAMAGE SUSTAINED DURING SHIPPING OR TRANSPORTATION, IMPROPER STORAGE, IMPROPER INSTALLATION, NEGLIGENCE OR WILLFUL MISCONDUCT OR OMISSIONS OF ANY PARTY OTHER THAN ICI, NORMAL WEAR AND TEAR, ABUSE, MISUSE, MODIFICATION, TAMPERING, NATURAL DISASTERS, ACCIDENTS, OR ACTS OF GOD.

THIS WARRANTY IS EXTENDED ONLY TO THE ORIGINALLY REGISTERED PARTY, ACCORDING TO THE VALID SERIAL NUMBER MATCHING THE ASSOCIATED PRODUCT. THIS WARRANTY IS NOT TRANSFERABLE.

TO OBTAIN SERVICE UNDER THIS WARRANTY:

1. THE PURCHASER MUST FIRST CONTACT ICI.
2. PRESENT THE DETAILS OF THE POTENTIAL WARRANTY CLAIM (ISSUE) TO ICI.
3. ICI WILL REVIEW THE DETAILS OF THE ISSUE, THEN WORK WITH THE PURCHASER TO TROUBLESHOOT THE PRODUCT(S) IN AN ATTEMPT TO RESOLVE THE ISSUE.
4. IF IT IS DETERMINED BY ICI THAT THE ISSUE REQUIRES A FORMAL WARRANTY CLAIM, ICI WILL PROVIDE ADDITIONAL INSTRUCTIONS FOR THE PURCHASER TO FOLLOW, WHICH MAY VARY DEPENDING ON THE UNDERLYING ISSUE.

RETURNING A PRODUCT FOR EVALUATION OR REPAIR:

1. THE PURCHASER MUST FIRST CONTACT ICI.
2. OBTAIN A RETURN AUTHORIZATION FORM FROM ICI, COMPLETE WITH A UNIQUE RETURN AUTHORIZATION NUMBER BY REFERENCING THE PRODUCT SERIAL NUMBER.
3. PROPERLY PACKAGE THE PRODUCT SO THAT DAMAGE CANNOT OCCUR DURING THE SHIPPING PROCESS.
4. PRINT A COPY OF THE RETURN AUTHORIZATION FORM, PLACING IT INSIDE OF THE PACKING LIST SLEEVE ON THE EXTERIOR OF THE BOX.
5. PRODUCTS MUST BE RETURNED TO ICI, FREIGHT PREPAID, FOR EVALUATION.
6. SEND TO: INDELAC CONTROLS INC., 6810 POWERLINE DR., FLORENCE, KY 41042

IF THE UNIT FAILED DUE TO POOR WORKMANSHIP OR MATERIALS, THE UNIT WILL BE EITHER REPAIRED OR REPLACED AT THE DISCRETION OF ICI. THE UNIT WILL BE RETURNED GROUND/STANDARD FREIGHT PAID BY ICI, IF AIR/RUSH SHIPMENT IS REQUESTED THE PURCHASER SHALL PAY THE DIFFERENCE.

THIS WARRANTY IS IN LIEU OF ALL OTHER OBLIGATIONS, LIABILITIES OR EXPRESSED WARRANTIES. ANY IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, IMPLIED WARRANTY OF MERCHANTABILITY ARE HEREBY EXPRESSLY EXCLUDED. IN NO EVENT SHALL ICI BE LIABLE FOR SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING IN CONNECTION WITH THE USE OF ITS PRODUCTS, OR FOR ANY DELAY IN THE PERFORMANCE OF THIS WARRANTY DUE TO CAUSES BEYOND ITS CONTROL.

SHIP TO ADDRESS: 6810 POWERLINE DR.-FLORENCE, KY. 41042
TELEPHONE: +1-859-727-7890
USA TOLL FREE: 1-800-662-9424
FAX: +1-859-727-4070
WEBSITE: WWW.INDELAC.COM

ACTUATOR TROUBLESHOOTING		
SYMPTOM	PROBLEM	SOLUTION
ACTUATOR DOES NOT RESPOND TO CONTROL SIGNAL.	Power not on Actuator incorrectly wired 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
	Input Command Signal not Present	Check wiring for connection & Proper polarity
	Position Potentiometer Problem	Check pot wiring & resistance
	Bad Brake (page 16)	Remove brake hub & try to run
ACTUATOR WILL NOT OPEN OR CLOSE COMPLETELY.	Travel limits incorrectly set (page 12) Valve torque too high for actuator Mechanical stops not removed	Recalibrate unit & reset cams. Install correct size actuator. Remove stops, CAUTION: Do not remove any part required for proper operation
	Positioner Board not set properly (page 12)	Recalibrate Zero & Span pots
	Position Potentiometer Problem	Check pot wiring & resistance
VALVE OSCILLATES.	Valve torque too high for actuator Actuator without brake installed on butterfly valve Motor brake out of adjustment (page 16) Set screw loose in brake disc	Install correct size actuator. Install brake Adjust brake Adjust brake and tighten set-screw
	Deadband is too tight	Adjust the Deadband pot on the Control board
MOTOR RUNS BUT OUTPUT SHAFT DOES NOT ROTATE.	Gear damage or sheared pin	Contact ICI or nearest distributor

NOTES

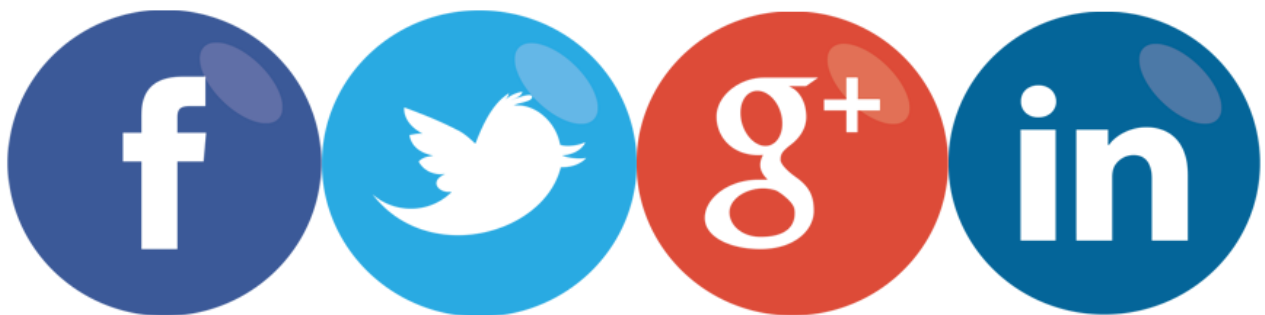
This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

NOTES

This image shows a single sheet of white paper with horizontal blue or grey ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

NOTES

[illegible]



Contact Information

Debbie Voges	dvoges@indelac.com	859-727-7890 ext. 100
Matt Robinson	mrobinson@indelac.com	859-727-7890 ext. 109
Talbot Caywood	tcaywood@indelac.com	859-727-7890 ext. 110

For Additional Product Information & Updates, Check Out Our Website: www.Indelac.com