

INDELAC

CONTROLS, INC.

ProVolt Multiple Voltage Electric Actuator
with Optional Battery Back-up

Installation, Operation &
Maintenance Manual

For Use with:
PV-4, PV-6, PV-10 & PV-15 Models

Additional supplements may be needed for selected optional equipment including, but not limited to models with: timers, speed controllers & remote/off/local controls.

MPV-220601

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For a digital copy of this manual, access to training videos, access to 3D product renderings,
or to request additional support

VISIT OUR WEBSITE AT 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 unit off the floor.
2. Store unit in a climate controlled building.
3. Store unit in a clean and dry area.
4. If unit includes a battery, make sure that the battery is put on a trickle charger.

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. Actuator serial number _____
5. Date of installation _____ Put into operation _____
6. Valve Data:
 - 6a. Manufacturer _____
 - 6b. Style & fig. No. _____
 - 6c. Size _____
 - 6d. End connection _____
 - 6e. Material of construction, Body _____ Stem & ball _____
 - 6f. Brake away torque _____ LB-IN @ _____ PSI
 - 6g. Other helpful data _____

MEDIA:

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

*It is important to pay close 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 actuator life will be shortened or it may not work at all and all Warranties will be void!

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TOOLS REQUIRED:

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

PV4 – 15 SERIES

Cover Screws
Terminal Strip Screws
Cam Set Screw
Mounting Pad Screws

7/16" Socket.
3/16" Wide Flat Head Screwdriver.
5/64" Allen Wrench.
1/2" 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

**** Wiring Terminal Block Screws – tighten to 3.6 in/lbs. torque!**



PRODUCT DESCRIPTION:

The ProVolt 4-15 Multiple Voltage Series Actuator is a quarter turn Open/Close Rotary Actuator that will work with all voltage inputs. With the flip of an internal switch on the board, these actuators can accept any of the following input voltages: 115vac, 230vac, 24vac, 24vdc or 12vdc. **No more ordering or stocking separate voltage actuators!**

The ProVolt series rotary electric actuator was designed for small and medium size valve and damper applications. This industrial grade reversing actuator is available in NEMA 4, NEMA 4X and NEMA 7 Enclosures. This new series of actuator can operate loads from 400 in/lbs. to 1500 in/lbs. and are enclosed in an enhanced “M” series housing. If you should have any questions regarding suitable or special applications, please contact your Indelac Sales Team.

The PV4-15 Series can also be ordered with the Optional Battery Backup Feature. When installed, the actuator’s internal battery will provide power to the motor in the event of an external power failure. The actuator can be configured in the field for FAIL OPEN or FAIL CLOSE and the motor will drive the valve to that position until the Mains power is restored. Switching from external power to battery power is seamless – when the external power source fails, the internal transfer circuit switches to battery power automatically without any operator intervention.

This unit can be ordered as either a Standard OPEN/CLOSE Actuator or as a Modulating Actuator for precise valve position control using 4-20mA, 0-10V or 1-5V external input signal. **NOTE:** The Modulating Option **CANNOT** be added in the field.

Other standard Options that can be added include Power Off Brake, Additional Conduit Entry, Heater and up to 2 additional auxiliary switches. A Speed Control or Timer Option can be added to the Standard ProVolt Actuator ONLY, but not on the Modulating version.

**WARNING!**

THIS ACTUATOR IS INTENDED TO BE USED AS DESCRIBED IN THIS MANUAL BY INDELAC CONTROLS. IF USED FOR ANY OTHER PURPOSES OTHER THAN SPECIFIED HERE, SEVERE DAMAGE COULD OCCUR TO THIS PRODUCT AND ANY OTHER PRODUCTS CONNECTED TO IT.

PROVOLT ACTUATOR SPECIFICATIONS:

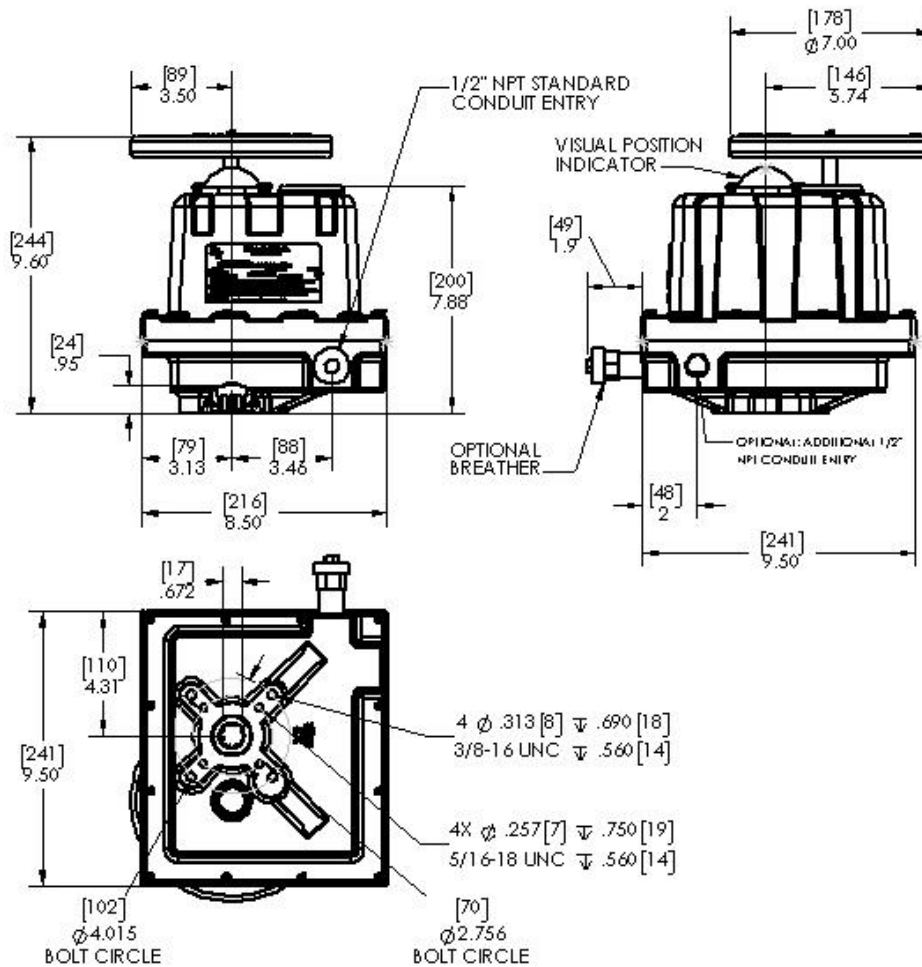
Enclosure rating:	NEMA 4 Standard; 4X, 7 & 4/7 also available
Motor Duty Cycle:	100% Standard (at 100% ambient temperature at rated torque)
Motor Locked Rotor Current:	2.5 Amps @ 12vdc
Actuator Full Load Amps:	AC: 115vac @ 0.45A, 230vac @ 0.28A, 24vac @ 1.3A, DC: 24vdc @ 1.3A, 12vdc @ 1.8A
Weight:	18 Lbs.
Mounting Pad:	ISO 5211 F07
Operating Voltages/Power:	AC: 115vac, 50/60Hz @ 55W; 230vac, 50/60Hz @ 55W; 24vac, 50/60Hz @ 35W DC: 24vdc @ 35W, 12vdc @ 25W
Mains Wiring Required:	18 AWG, 300V, 105°C minimum for all voltages, Class 1 Wiring 12 AWG maximum (Terminal block maximum rated) <i>*Maximum run with 12 AWG on DC units is 80 Feet.</i>
Incoming Power Fuse:	TE5 Pico Fuse, 250V @ 4A Rectangular Box (#46116)
Motor Fuse:	TE5 Pico Fuse, 250V @ 2.5A Rectangular Box (#46115)
Optional Heater Power:	Add 15 Watts for optional 12vdc heater
Position Indication:	Dome Style Visual Indicator
Optional Battery:	12vdc, 0.8Ahr, Sealed Lead Acid (SLA), Rechargeable
Battery Recharge Time:	Approximately 8 Hours
Battery Life on Trickle Charge:	3-4 years
Auxiliary Switch Rating:	Dry Contact, 10 Amps @ 250vac Maximum
Input Signal Contact Rating:	12vdc @ 0.5A minimum (Dry Contact Only – NO External Voltage)
Operating Temperatures:	-4°F to 104°F (-20°C to 40°C); Heater required below 0°F

Certification:



MECHANICAL MOUNTING:

The ProVolt Actuator can be direct mounted to any valve using the standard ISO 5211 F07 Output. Optional Inserts are available for ISO 5211 F03 and ISO 5211 F04. See the drawing below for the actuator output mounting dimensions for valves requiring mounting hardware.



Actuator Bottom View

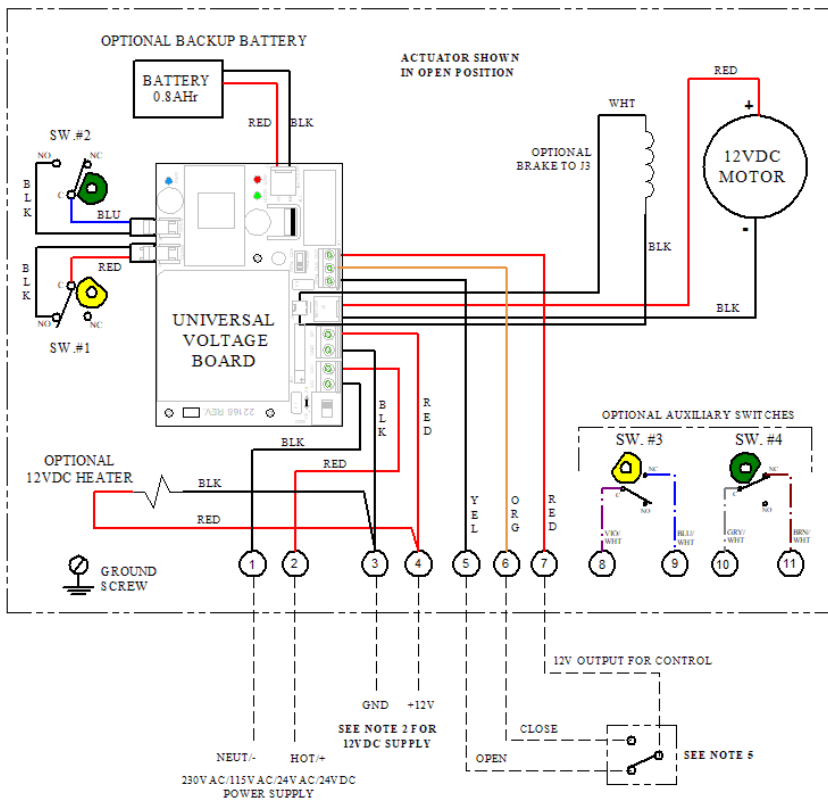
Reference Image:
Actuator mounted to sample ball valve.



CUSTOMER ELECTRICAL CONNECTIONS FOR STANDARD OPEN/CLOSE:

All customer electrical connections are done per the below wiring diagram. Incoming power should be wired using 18awg minimum and up to 12awg maximum wires. Control signal wiring may be 18awg or larger for direction control. All wiring is to be completed through the 1/2"-14 NPT conduit opening using the appropriate conduit – **Refer to your local electrical codes – Class 1 Wiring. Remove the Plastic Conduit Hole Plug from the Conduit Entry Hole and Discard – this is a temporary protector for shipping only.** Next, remove the actuator cover by loosening the cover screws and pulling straight up on the cover to complete the wiring and set-up. Assure that all power is DE-ENERGIZED when making the wiring connections. Do not energize power to the actuator until the set up steps have been completed. When re-installing the cover, pay close attention to the wiring and make sure that none of the wires get pinched or damaged.

WARNING!
Pay close attention to the Wiring Diagrams when connecting the input power to the actuator. Improper power connection can result in damage to the actuator or serious injury to the installer.

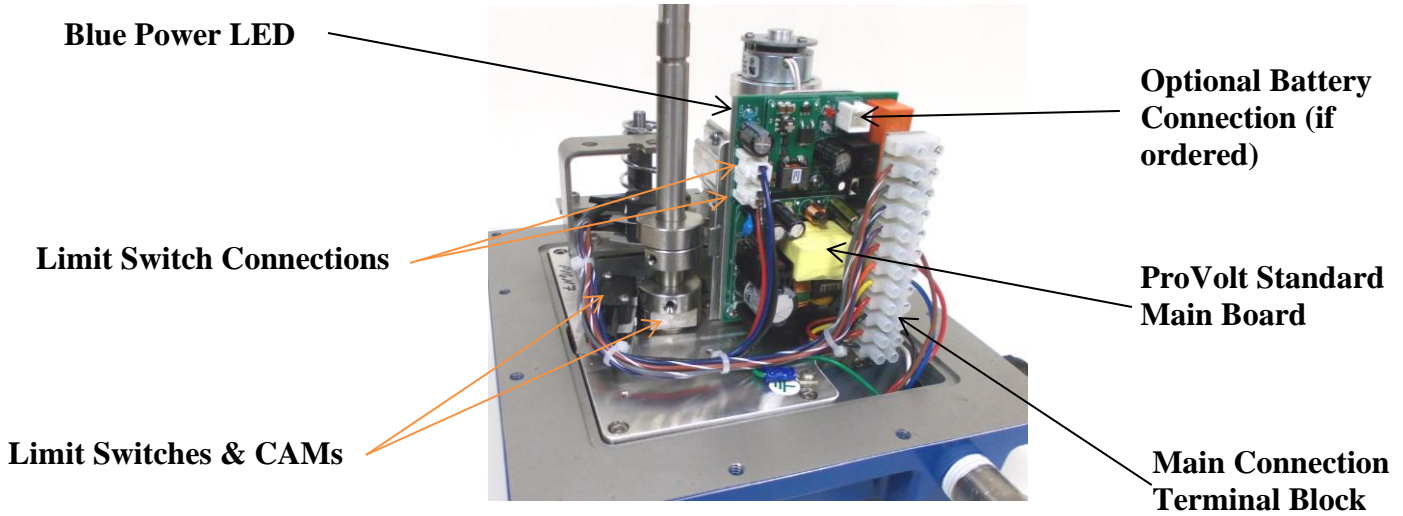


- SWITCH LAYOUT**
- USE STABILIZER BRACKET WITH 4 OR MORE SWITCHES IN A STACK.
 - SW #3: OPEN AUXILIARY SWITCH
 - SW #4: CLOSE AUXILIARY SWITCH
 - SW #1: OPEN LIMIT SWITCH
 - SW #2: CLOSE LIMIT SWITCH
- NOTES:**
- CONTROL CAN OPERATE WITH 230V AC, 115V AC, 24V AC, 24VDC OR 12VDC INPUT. VOLTAGE INPUT SWITCH NEEDS TO BE MOVED TO POSITION THAT MATCHES THE POWER INPUT VOLTAGE - "115" (UP) POSITION FOR 230V & 115V OR "24" (DOWN) POSITION FOR 24V AC & 24VDC. 12VDC SWITCH POSITION DOES NOT MATTER. SEE MANUAL FOR INPUT CURRENT REQUIREMENTS.
 - IF 12VDC INPUT VOLTAGE IS USED, THAT POWER CONNECTS TO TERMINALS 3 & 4
 - FUSE IS SQUARE PLUG IN STYLE, 250V AC. SEE MANUAL FOR FUSE RATINGS
 - CAMS FOR LIMIT SWITCHES ARE PRESET AT THE FACTORY. TO INCREASE OR DECREASE VALVE MOTION, THE CAMS CAN BE ADJUSTED SLIGHTLY.
 - COMMAND SIGNAL USES A SINGLE POLE, DOUBLE THROW CONTACT (RELAY OR SWITCH) RATED FOR 0.5AMPS OR MORE. **DO NOT CONNECT EXTERNAL VOLTAGE SOURCE TO TERMINALS #6 OR #7!**
 - WHEN INCOMING POWER IS PRESENT, BLUE LED WILL BE LIT AND ACTUATOR RUNS OFF OF INCOMING POWER. WHEN INCOMING POWER FAILS OR THE INPUT FUSE BLOWS, THE BLUE LED WILL TURN OFF.
 - OPTIONAL AUXILIARY SWITCHES ARE WIRED TO BE 'NORMALLY OPEN' AND WILL CLOSE (CONTINUITY) WHEN THE ACTUATOR GETS TO THE DESIRED POSITION.
 - OPTIONAL HEATER WILL ONLY OPERATE WHEN MAIN INCOMING POWER IS PRESENT. HEATER WILL SHUT OFF UNDER BATTERY POWER.
- OPTIONAL BATTERY BACK UP:**
- IF THE OPTIONAL BATTERY BACK UP IS ORDERED, THE UNIT IS SHIPPED WITHOUT THE BATTERY PLUGGED IN. AFTER INSTALLING UNIT AND CONNECTING INCOMING POWER, PLUG BATTERY CONNECTOR INTO THE UNIVERSAL VOLTAGE BOARD. J1
 - THE FAIL SWITCH NEEDS TO BE SET IN THE 'OPEN' OR 'CLOSE' POSITION PRIOR TO INSTALLING THE COVER. WHEN INCOMING POWER FAILS, THE ACTUATOR WILL MOVE TO THE OPEN OR CLOSE POSITION BASED ON THE SWITCH SETTING.
 - WHEN POWER FAILS, THE BLUE LED WILL TURN OFF AND THE GREEN BATTERY LED WILL LIGHT - ACTUATOR WILL RUN TO THE 'FAIL' POSITION UNDER BATTERY POWER AND REMAIN THERE UNTIL INCOMING POWER IS RESTORED.
 - RED LED WILL LIGHT WHEN BATTERY VOLTAGE GETS TOO LOW.

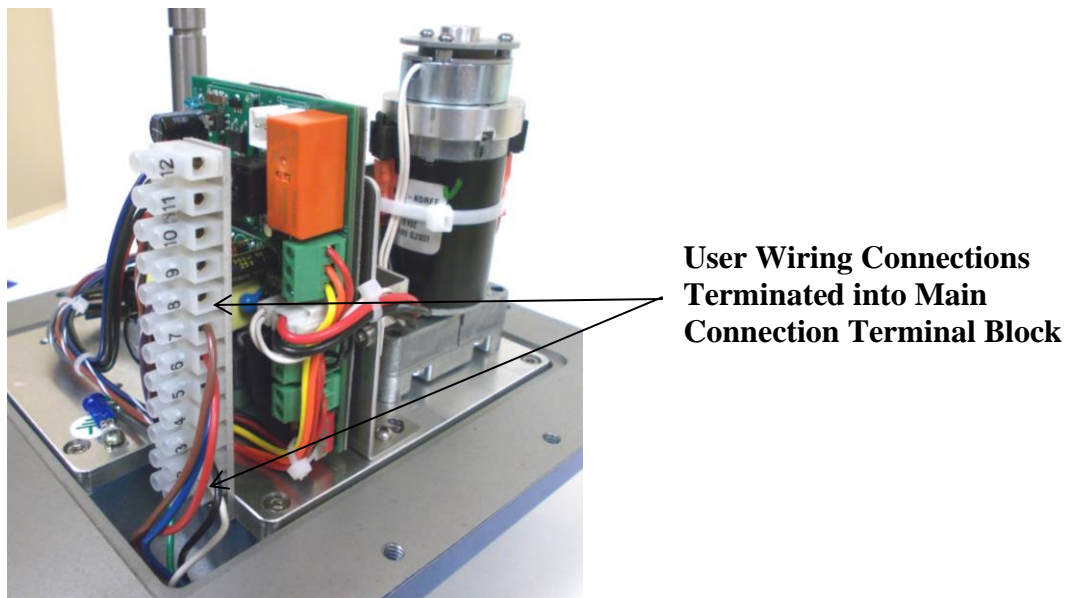
FIELD WIRING

W201125

STANDARD ACTUATOR CONNECTION WIRING DIAGRAM



Standard Actuator Internal Components



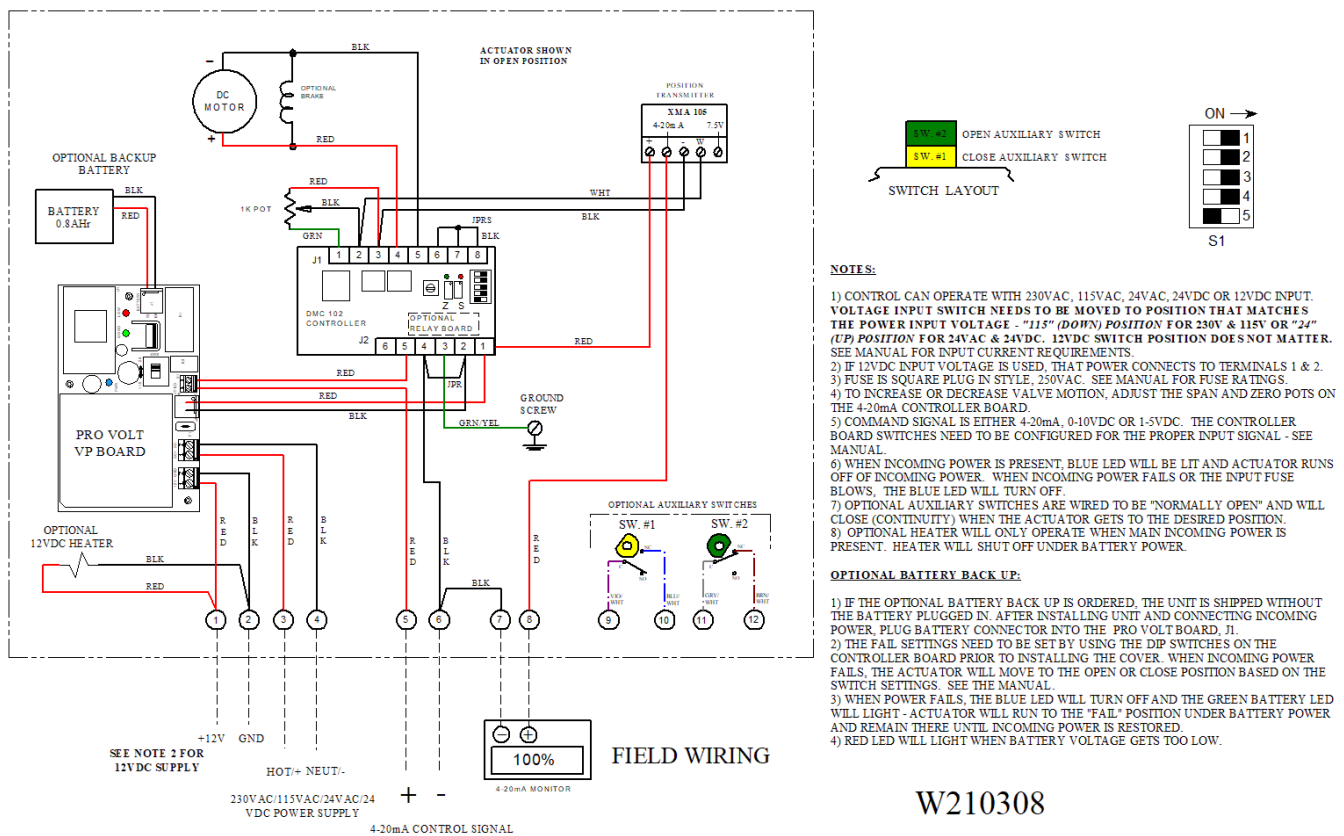
Customer Connections – Terminal Block

NOTE: Make sure the wires are fully seated & tightened after making all wiring connections. Wire terminal screws to be tightened to 3.6 in/lbs. (0.4Nm) torque.

CUSTOMER ELECTRICAL CONNECTIONS FOR MODULATING OPTION:

All customer electrical connections are done per the below wiring diagram. Incoming power should be wired using 18awg minimum and up to 12awg maximum wires. Control signal wiring may be 18awg or larger for direction control. All wiring is to be completed through the 1/2" NPT-14 conduit opening using the appropriate conduit – **Refer to your local electrical codes – Class 1 Wiring. Remove the Plastic Conduit Hole Plug from the Conduit Entry Hole and Discard – this is a temporary protector for shipping only.** Remove the actuator cover by loosening the cover screws and pulling straight up on the cover to complete the wiring and set-up. Assure that all power is DE-ENERGIZED when making the wiring connections. Do not energize power to the actuator until the set up steps have been completed. When re-installing the cover, pay close attention to the wiring and make sure that none of the wires get pinched or damaged.

⚠ WARNING!
Pay close attention to the Wiring Diagrams when connecting the input power to the actuator. Improper power connection can result in damage to the actuator or serious injury to the installer.



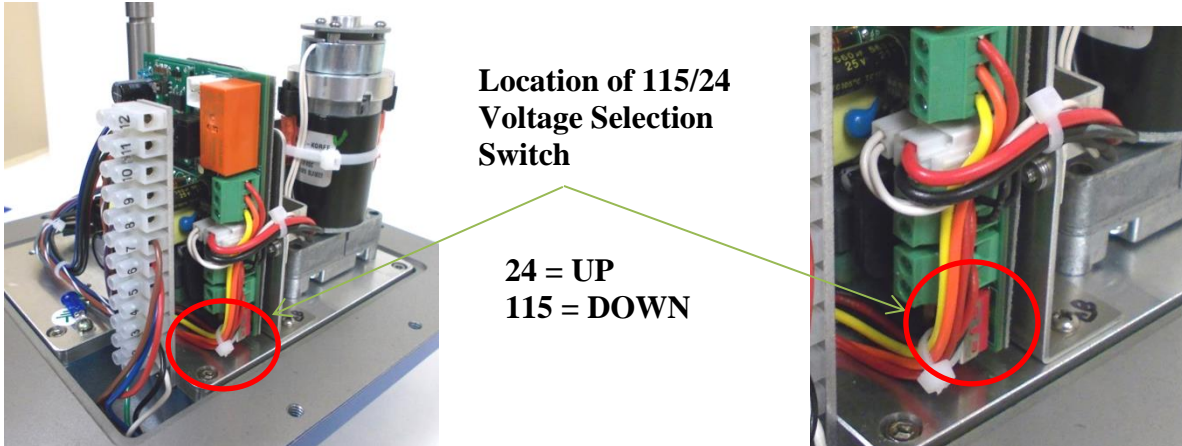
W210308

MODULATING ACTUATOR CONNECTION WIRING DIAGRAM

ACTUATOR SET-UP FOR STANDARD OPEN/CLOSE ACTUATOR:

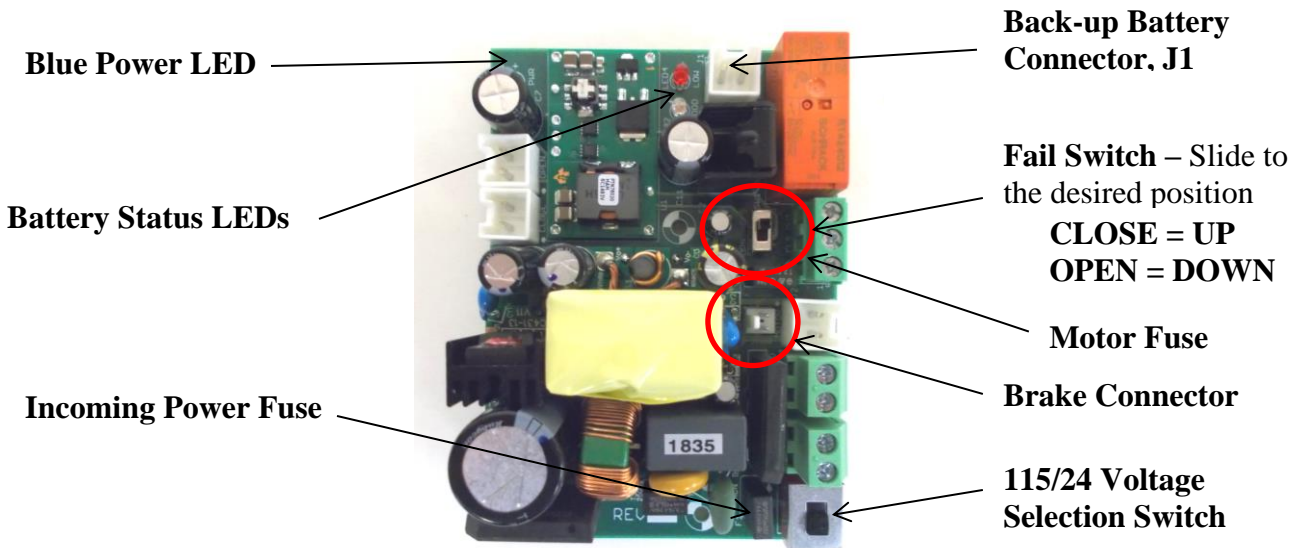
After the actuator is mounted mechanically to the valve and the external electrical wiring is complete, the actuator is ready for set up. The actuator cover will need to be removed, if not already done so.

- 1) On the ProVolt Standard circuit board, set the “voltage” switch to the proper incoming voltage setting:
 - 115** = 230vac, 115vac or 12vdc incoming voltage – move switch DOWN
 - 24** = 24vdc or 24vac incoming voltage – move switch UP



- 2) If the *battery back-up option* has been installed, move the “Fail Switch” on the ProVolt Standard board to the desired “FAIL” position. The description of the 2 positions are as follows:

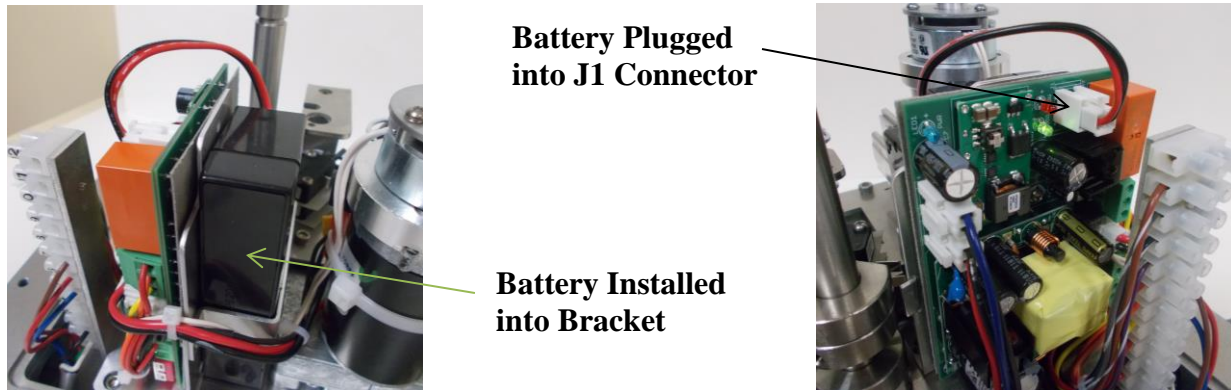
OPEN = ACTUATOR WILL MOVE TO THE OPEN POSITION WHEN POWER FAILS.
CLOSE = ACTUATOR WILL MOVE TO THE CLOSE POSITION WHEN POWER FAILS.



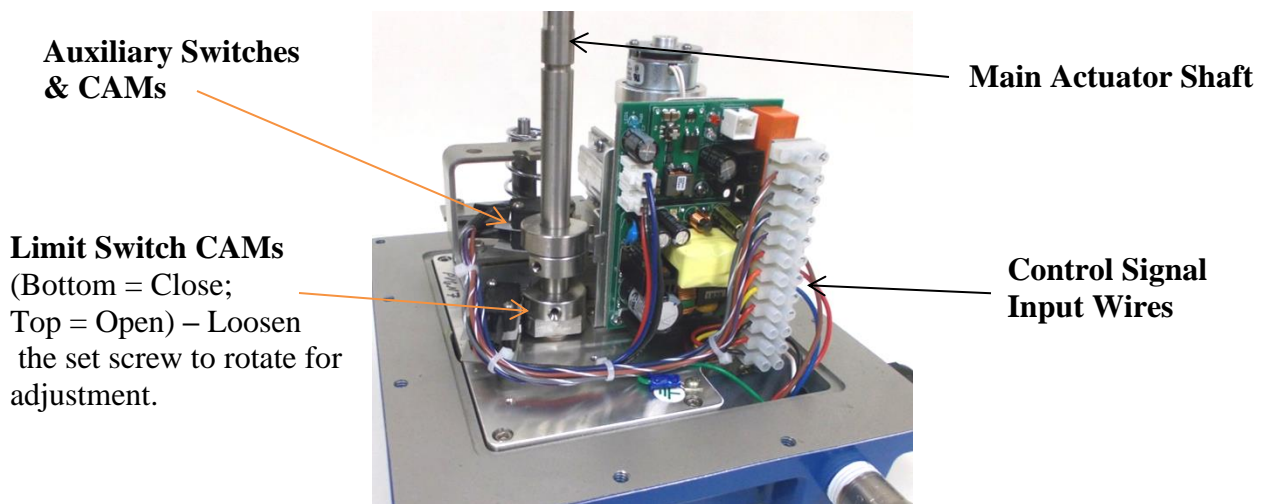
ProVolt Standard Main Board – Front View

**** DO NOT switch the FAIL switch while the actuator is moving – Turn OFF power and unplug the battery before moving the FAIL switch!**

- 3) Plug the battery connector into the ProVolt board at position J1. **NOTE:** If the “Fail Switch” was moved to the “CLOSE” position, the actuator will begin to move to the Close location since the actuator is shipped in the OPEN position.



- 4) Turn ON the Mains power to the actuator.
- 5) Verify that all wires and connectors are properly seated and terminal block screws are tight.
- 6) Using the external direction control signal, run the actuator open and closed to verify that the valve is opening and closing fully. If not, the Open and Close CAMs may be adjusted to allow more or less motion in both directions. The CAM set screw needs to be loosened to rotate the CAM (see steps below). Re-tighten the set screw when the desired valve position is achieved.
- 7) The standard CLOSE motion of the shaft is Clockwise. To increase motion in the CLOSE direction (more CW), rotate the CLOSE CAM Counter-Clockwise. To decrease motion in the CLOSE direction, rotate the CLOSE CAM Clockwise. Do this in small increments to get the desired positioning.
- 8) The standard OPEN motion of the shaft is Counter-Clockwise. To increase motion in the OPEN direction (more CCW), rotate the OPEN CAM Clockwise. To decrease motion in the OPEN direction, rotate the OPEN CAM Counter-Clockwise. Do this in small increments to get the desired positioning.



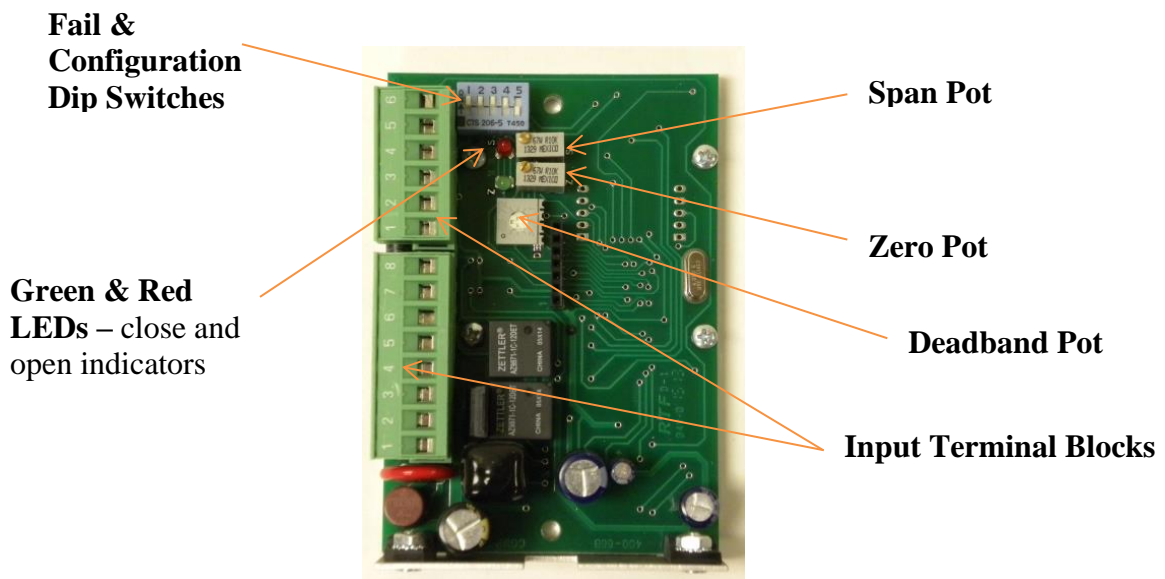
- 9) After the proper valve/actuator travel settings have been set up, the auxiliary switches and CAMs can be set up and calibrated in the same way the OPEN and CLOSE CAMs were.
- 10) Once the actuator is set up and the valve/actuator OPEN and CLOSE have been set to satisfaction, turn off the main power.
- 11) If the battery backup option has been installed, the actuator may move to the set FAIL position.
- 12) Re-install and bolt down the actuator cover making sure not to pinch or crimp any wires inside the unit.
- 13) Torque the cover bolts to the proper torque (75 in/lbs.).
- 14) Reapply power and re-check the proper operation of the actuator.

**** If the control signal is provided by a PLC relay/closure, the programmer should incorporate a delay between the OPEN & CLOSE signal.**

ACTUATOR SET-UP FOR MODULATING OPTION ACTUATOR:

After the actuator is mounted mechanically to the valve and the external electrical wiring is complete, the actuator is ready for set up. The actuator cover will need to be removed, if not already done so.

- 1) The ProVolt Modulating board will supply power to the DC Modulating Controller Board. The Modulating Controller Board will control the actuator motor and position based on the command signal applied to the unit.



DC Modulating Controller Board

- 2) Set the DIP Switches on the Modulating Controller Board using the following chart. This will set the board up for the proper input signal, loss of command signal and Normal vs. Log Rate function. **DO NOT CHANGE ANY DIP SWITCH SETTINGS WITH POWER APPLIED OR DAMAGE TO THE BOARD WILL OCCUR.**

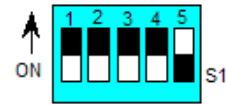
S1

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

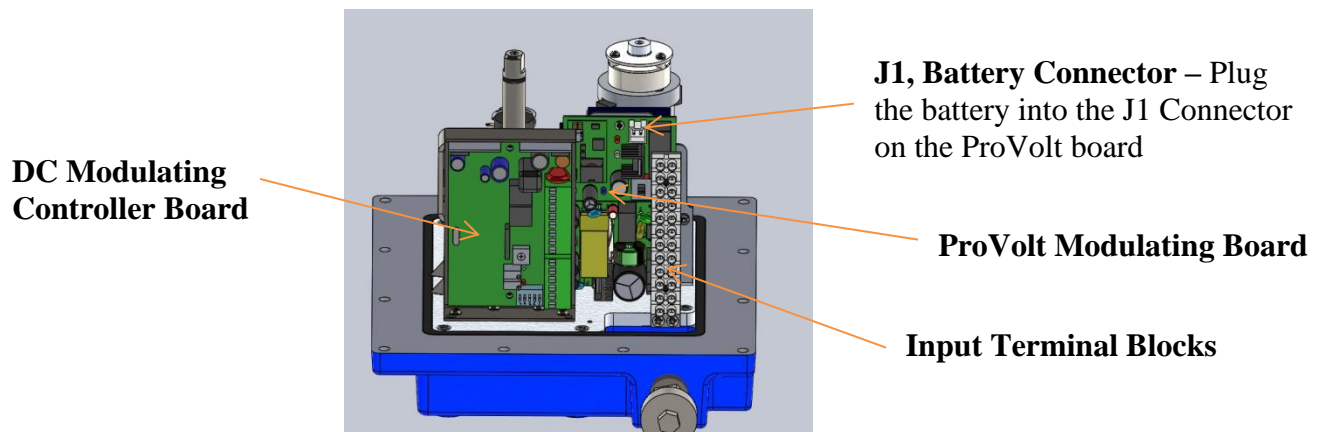
NOTE: All other settings are not valid and can cause abnormal operation.

CONTROL FUNCTION	SW5
Calibrate/Normal	OFF
Log Rate	ON



Switch settings for Standard 4-20mA Input with FAIL In Place Option

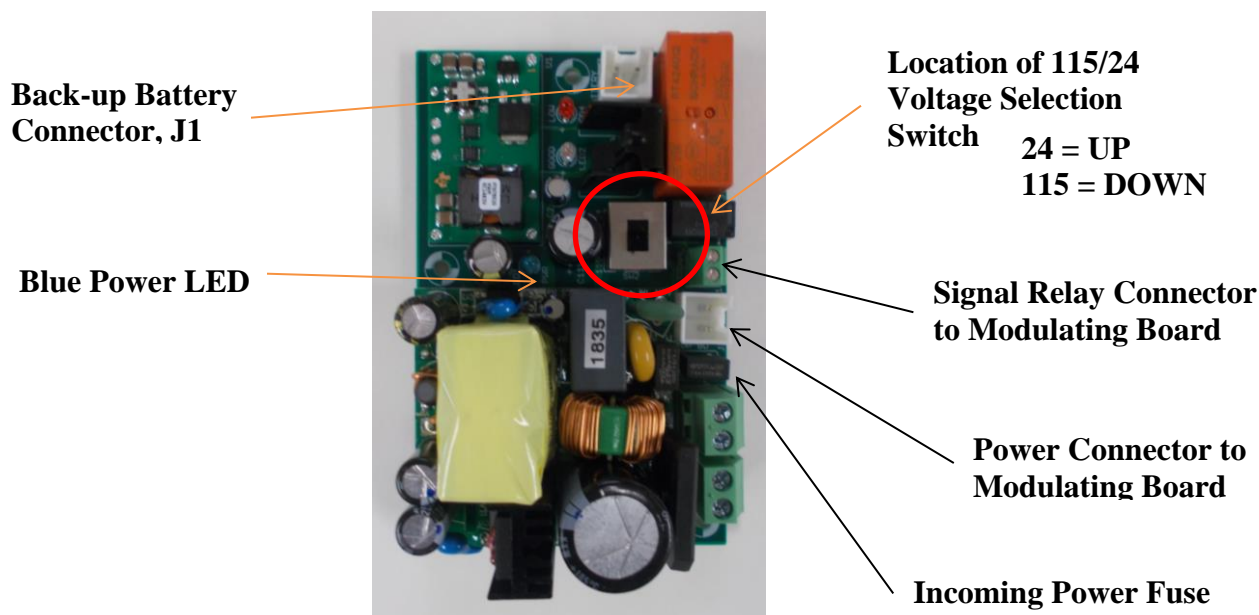
- 3) If the **battery back-up option** has been installed, plug the battery connector into the ProVolt Modulating board at position J1.



ProVolt Modulating Actuator View

NOTE: With Battery Backup Option installed, a relay on the ProVolt Modulating Board will break the 4-20mA signal connection to the DC Modulating Board when the input power fails. The battery power will supply power to the DC Modulating Board to run the motor to the selected FAIL position, set by the DIP switches. The actuator/valve will remain in that position until the power is restored. If there is no battery, the actuator will FAIL in place.

- 4) On the ProVolt Modulating circuit board, set the “voltage” switch to the proper incoming voltage setting:
 - 115** = 230vac, 115vac or 12vdc incoming voltage – move switch DOWN
 - 24** = 24vdc or 24vac incoming voltage – move switch UP



- 5) Turn ON the Mains power to the actuator.
- 6) Apply the command signal (4-20mA, 0-10v, etc.) to run the actuator open and closed to verify that the valve is opening and closing fully. If not, the ZERO (CLOSE) and SPAN (OPEN) pots on the Controller Board may be adjusted to allow more or less motion in both directions.
- 7) When the 4mA signal is applied, the actuator should move to the CLOSE position. The Green LED on the DC Modulating Board will illuminate during the actuator’s motion. When the actuator/valve has reached the calibrated position, the Green LED will turn OFF and the actuator motor will stop.
- 8) When the 20mA signal is applied, the actuator should move to the OPEN position. The Red LED on the DC Modulating Board will illuminate during the actuator’s motion. When the actuator/valve has reached the calibrated position, the Red LED will turn OFF and the actuator motor will stop.
- 9) Make SPAN or ZERO pot adjustments in small increments. If these pots are adjusted too far in one direction or the other, the actuator can get out of calibration and it may be difficult to re-calibrate. If the Red and/or Green LEDs turn on and there is no motion from the motor, there is a problem with the Modulating board and it will need to be replaced.
- 10) If the actuator has problems going to the correct Open or Close position, see the MODULATING CALIBRATION SECTION for further details.
- 11) Re-install and bolt down the actuator cover making sure not to pinch or crimp any wires inside the unit.
- 12) Torque the cover bolts to the proper torque (75 in/lbs.).
- 13) Reapply power and re-check the proper operation of the actuator.

STANDARD & MODULATING ACTUATOR OPERATION:

Upon applying external supply power to the actuator, the Blue LED on the ProVolt Board should illuminate indicating that the power from the external Mains is on and that the Incoming Power Fuse is good. See pictures above for LED and fuse locations. Apply a command signal to the actuator via the terminal block as called out on the wiring diagram to OPEN and CLOSE the actuator/valve. On the Standard Actuator, this signal is a dry contact using a relay contact or SPDT switch ONLY. **DO NOT APPLY A VOLTAGE TO THE COMMAND SIGNAL TERMINALS!**

NOTE: The Command Signal Terminals for the ProVolt Standard Actuator provides an internal 12vdc through user supplied dry contacts to OPEN and CLOSE the actuator. Do NOT apply an **external** voltage source to these contacts otherwise damage will occur to the ProVolt Board. ONLY a set of dry contacts from a user supplied switch or relay are to be used to command the actuator OPEN and CLOSED.

The Command Signal for the Modulating version actuator will be either a 4-20mA, 1-5vdc or 0-10vdc. The DIP switch settings on the DC Modulating Controller Board are set prior to operation to match the incoming Command Signal (refer to the ProVolt Modulating Actuator Set Up Section above). As the Command Signal increases and decreases, the actuator will appropriately OPEN and CLOSE proportionally in response to the Command Signal.

If an optional Position Feedback Transmitter is installed, the appropriate 4-20mA feedback signal will be available at the input terminal block to connect to the user's monitoring device. This signal will increase and decrease in real time as the actuator moves from CLOSE to OPEN and back to CLOSE again.

If the Optional Heater has been installed, the Heater will operate when the external power supply is on. If the external power supply should fail and the actuator runs on battery power, the Heater will **NOT** be operational.

The optional Power Off Brake, if installed, will lock the motor in place and prevent back drive of the actuator/valve when the actuator is idle. When a command signal is applied and the motor moves, the brake "unlocks" to allow motion.

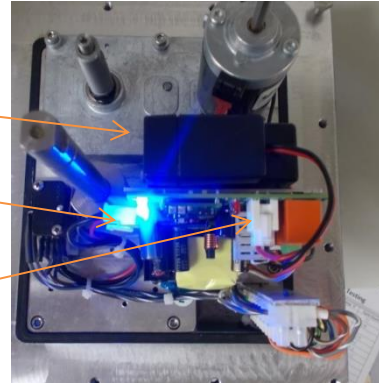
OPTIONAL BATTERY BACK UP FEATURE OPERATION:

If the unit is equipped with the Optional Battery Backup, the battery will supply power to the motor to drive the actuator/valve to a user selected FAIL position. The Blue LED will turn off and the Green LED will illuminate indicating that the actuator is now running on battery power when incoming power fails or the Incoming Power Fuse blows. When this occurs, the actuator will move to the desired FAIL position (OPEN or CLOSE), as selected by the operator during set-up. On the Standard unit, the FAIL switch is located on the ProVolt Standard Board and can be set for OPEN or CLOSE. This FAIL switch should NOT be used to OPEN and CLOSE the actuator under battery power. The FAIL switch is designed to be set during actuator set up. If the position needs to be changed, all power needs to be turned OFF and battery power removed before resetting the FAIL switch. Failure to turn OFF all power before moving the FAIL switch will damage the ProVolt Standard Board.

Battery Location

Blue Main Power LED

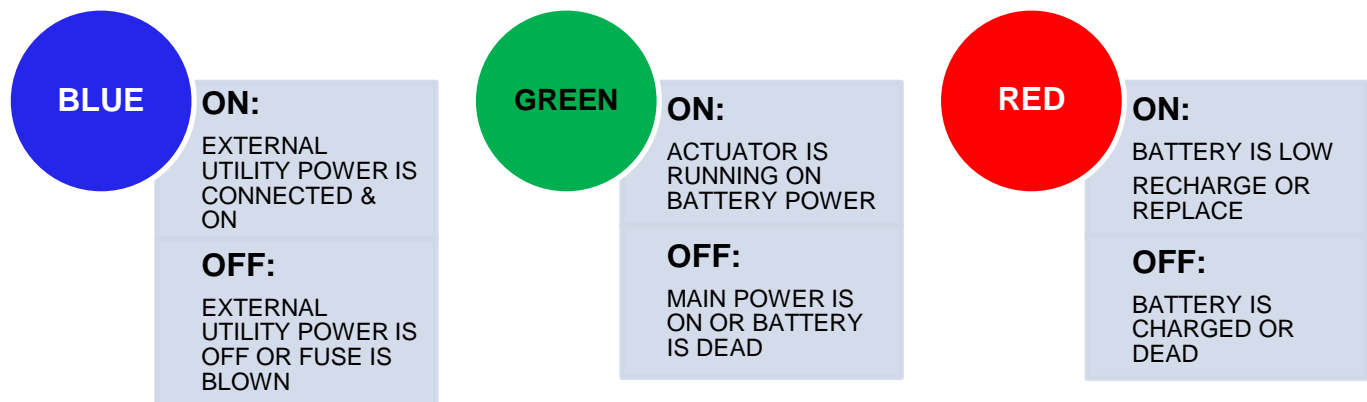
Battery Connector



ProVolt Actuator Top View – Battery Option

If the battery has been installed on the Modulating version, the actuator will run to the FAIL position selected by the DIP switch settings on the DC Modulating Controller Board. This occurs when incoming power fails, as described in the Modulating Set Up Section (see the Settings Chart for the DIP switch settings). All DIP switch settings are ONLY to be changed with the power OFF to the actuator. Changing the DIP switch settings with the power ON will damage the DC Modulating Controller Board.

If the ProVolt Board Green Battery Status LED should turn off and the Red LED turn on, this indicates that the battery power is low. The battery either needs to be charged or replaced. There is a battery charge circuit built into the Pro-Volt actuator that will charge the battery when the external power is on. If after 8 hours of “on board” charging, the Red LED remains on, then the battery needs to be replaced. **If the battery is too low or dead, ALL LEDs will be OFF and the actuator will FAIL in place.**



Battery life of the Sealed Lead Acid battery is between 3-4 years as long as the MAINS power to the actuator is ON to maintain a trickle charge to the battery. If the actuator is turned off or stored for 5 months or more, the battery will drain to a low point where it may not be able to be recharged. Batteries need to be re-charged every 5-6 months to avoid the internal cells from getting too low to where they will not take a charge.

Once the battery charge gets below 6-7vdc, it may not take a charge due to internal cell damage. To charge a battery that low, the “on board” trickle charger will not work. A larger charger may charge low batteries. But, even if it does take a charge, the battery may be unreliable and **SHOULD be REPLACED!**

See the OPTIONAL BATTERY INSTALLATION SECTION for Instructions.

RECALIBRATION OF DC MODULATING BOARD:

If the ProVolt Modulating Actuator should not respond to the input signal properly, the unit may need to be recalibrated back to the factory settings. Follow the below steps to re-calibrate the unit.

- 1) Power the motor and valve to 45° or mid-position between open and close.
- 2) Turn the Mains power to the actuator OFF so that the motor does not move.
- 3) Loosen set screw on the potentiometer shaft gear.

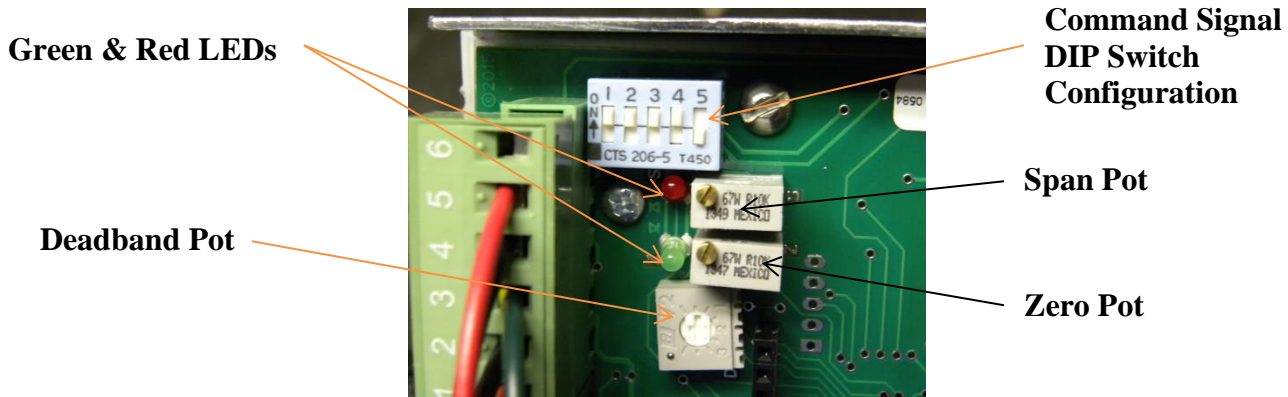


- 4) Pull the 8-terminal J1 green connector out away from the controller board so that the potentiometer is isolated from the circuit card.
- 5) Using a Digital Volt Meter (DVM), measure the resistance of the potentiometer between terminals 2 & 3 at the free hanging J1 connector.
- 6) Rotate the potentiometer 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. This may be either to a white input terminal strip or directly to the 6-terminal J2 Connector. The connections at J2 (6 Terminal Green Connector) are: terminal 4 = (-); terminal 5 = (+). Consult your actuator's wiring diagram for the proper terminal connections.

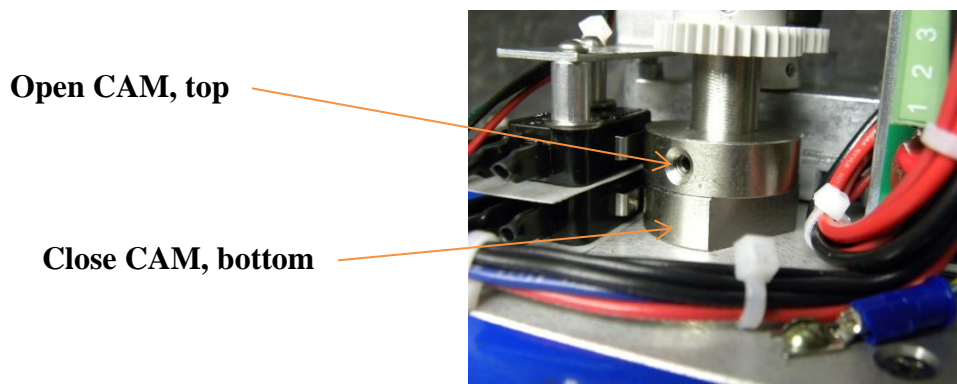


- 10) Cut the wire tie from around the motor and carefully pull the Red motor wire and connector off the "+" motor terminal. Pull aside so that it does not make contact with the motor or any metal parts.
- 11) Set the User Control Signal to the CLOSE level (0%) - 4.0mA or 0V.
- 12) Make sure the Deadband pot on the controller board is at mid position.

- 13) Turn the Mains power back ON to the actuator. Use **CAUTION** with the next few steps because power is present and an electrical shock is possible.
- 14) The Green LED on the board should come on. If not, adjust the Zero Pot until the Green LED illuminates.

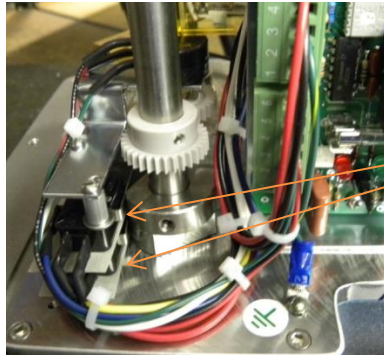


- 15) If any of the LEDs are blinking or flashing or there is a question regarding the setup of the Command Signal Configuration Switches, please see the Positioner Data Sheet.
- 16) Connect and lightly hold the Red motor wire onto the “+” motor terminal so that the valve moves in the CLOSE direction.
- 17) 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.
- 18) Adjust the Zero Pot so that both the Green and Red LEDs are OFF.



- 19) 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.
- 20) The Red LED should turn on.
- 21) Connect and lightly hold the Red motor wire onto the “+” motor terminal so that the valve moves in the OPEN direction.

- 22) 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.
- 23) Adjust the Span Pot so that both the Green and Red LEDs are OFF.



**Limit Switch
Levers Pressed In
to Switch Body**

- 24) 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.
- 25) 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.
- 26) Turn OFF the Mains Power and check that all of the set screws are tightened. Carefully replace the actuator cover and tighten the screws. Take care not to pinch or damage any wires with the cover.
- 27) Re-apply the Mains power to the actuator and re-check all of the settings.

MECHANICAL OVER LOAD:

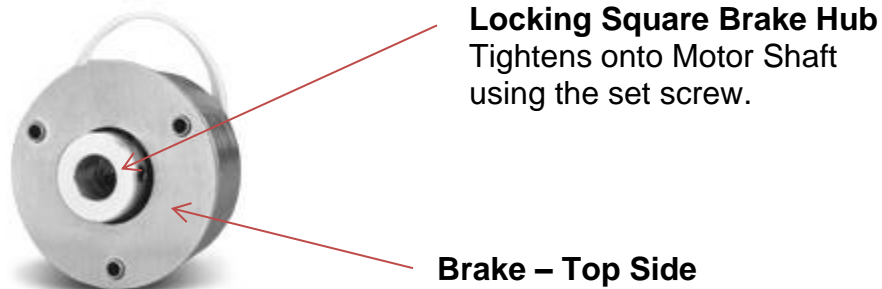
Indelac ProVolt actuators are mechanically designed to withstand stall conditions. It is not recommended to subject the unit to repeated stall conditions; however, should it occur the actuator would not experience gear damage.

MOTOR OVER LOAD - FUSE:

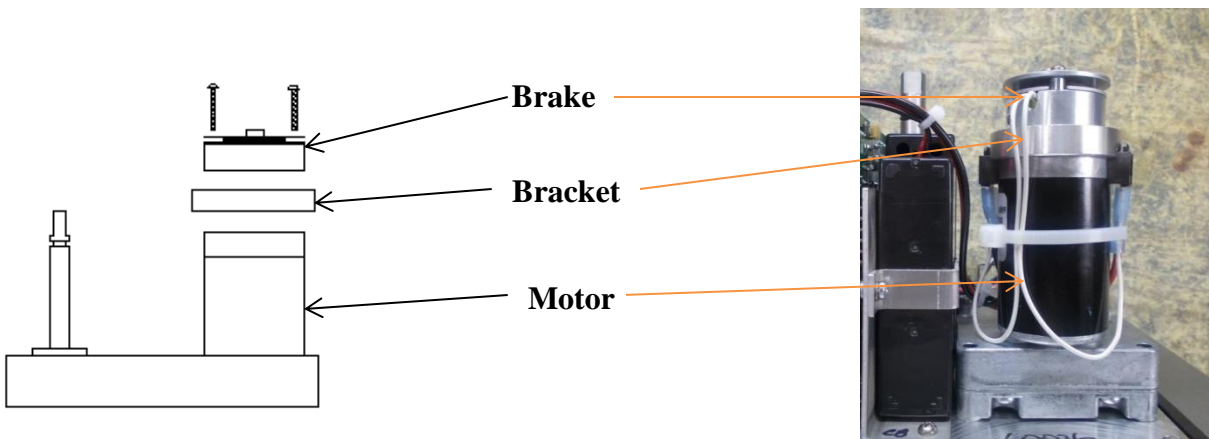
The ProVolt series actuator motors are fused with a 250V, **2.5A slow blow fuse**. When the motor current rises to an overload level, the on-board fuse will blow. The fuse will need to be replaced with the exact voltage and current rating as listed in this manual. It is the responsibility of the operator to check the entire system and clear any jams or valve binding prior to restarting the system. See board diagrams & photos above for motor fuse part number and location.

OPTIONAL MECHANICAL BRAKE:

The ProVolt Actuators have the option to be fitted with a 12vdc Spring Applied Power OFF Brake. These can be ordered installed on the actuator, or added to the actuator in the field.



This brake will Open up to allow the motor shaft to spin freely when the DC power is applied to the motor. When the DC motor power turns OFF, the brake will LOCK the motor shaft in place and keep it from moving and thereby keep the Valve from back driving the Actuator. This is especially helpful in Butterfly Valve & Damper Applications.



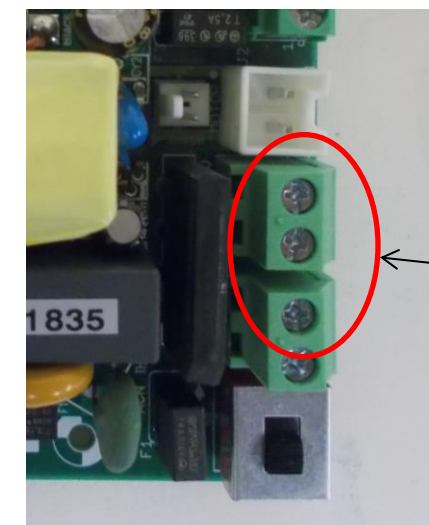
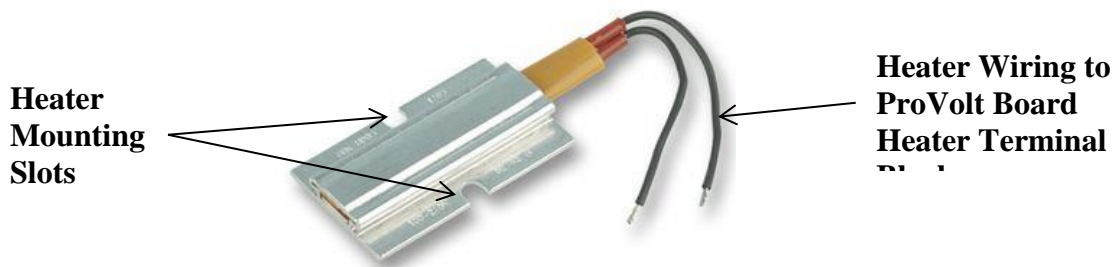
A 12vdc Power Off Brake can be installed in the field when purchasing the ProVolt Brake Kit from Indelac. The brake will mount to the top of the actuator motor using the provided screws and bracket. The brake wiring connector will plug directly into the ProVolt Brake Header on the Standard board or the connector gets cut off and wired into the DC Modulating Controller Board motor terminals on the Modulating unit. There is no polarity to the brake wires, so the positive (+) and negative (-) does not matter. Refer to the above board photos for connector locations and the wiring diagrams for electrical connections.

HUB INSTALLATION: When the brake is mounted to the motor, slide the brake hub over the motor shaft being certain the square of the hub mates inside the friction disk of the brake. With the brake de-energized, bottom out the hub on the armature plate of the brake and pull the hub back out 0.010"-0.025" up from the plate and tighten the hub set screw to 5 in/lbs. torque. The brake hub should not make contact with the bottom of the brake armature plate.

HEATER AND CONDENSATION:

The ProVolt Actuator has the Option to have an internal Heater installed when manufactured or later in the field. The heater comes with 2 wires that connect into the ProVolt Standard or Modulating Board Power Input Terminal Block – polarity DOES NOT matter. The wires are installed into the Terminal Block, one wire into each terminal, and the screws securely tightened (see wiring diagrams for proper terminals and location). The Heater is self-regulating and does NOT require a thermostat to regulate the temperature. The Heater mounts to the Motor Aux. Switch Bracket using 2 - #8 screws. The Heater adds about 15W to the overall power consumption of the Actuator.

It is recommended that a Heater, **#25020**, be installed in applications where the Actuator is subject to Cold Weather and/or Humid Conditions. The Heater will maintain adequate temperature inside the enclosure for the components in Cold applications. It will also maintain a constant temperature to eliminate Condensation in Humid Environments. The heater will get hot when MAINs power is applied, to about 104°F (40°C). **The Heater is NOT ON if the ProVolt is running on Battery Power – ONLY when running on Mains Power!**



**Power Input Terminal Block –
Connect Heater Wires Here
(see wiring diagrams)**

OPTIONAL AUXILIARY SWITCH CONTACT RATINGS:

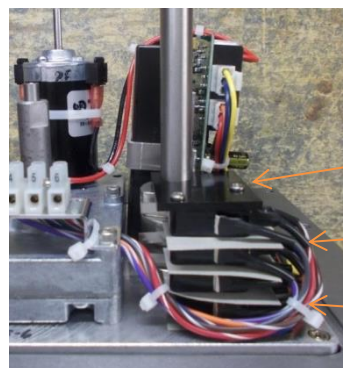
The Optional Snap Action Auxiliary Switches are SPDT and the contacts are rated for: 10 Amps @ 250 VAC.

ProVolt Actuator Auxiliary Switches are wired so that the switch “closes” when the actuator reaches the desired position and there is continuity across the switch. For example, when the actuator reaches the full OPEN position, the OPEN Auxiliary Switch will close and complete the circuit (continuity) between the two OPEN Auxiliary Switch Terminals. This works the same for the CLOSE Auxiliary Switch. The CAMs for these switches can be adjusted to trigger the appropriate signal per the user requirements.

Most Auxiliary switches are ordered with the unit, but an Auxiliary Switch Kit can be ordered and installed in the field. Follow the appropriate wiring diagram for electrical connections of the switch wires.

On the ProVolt Standard Actuator, the Auxiliary Switches will mount directly on top of the motor limit switches. This kit will include 2 wired switches, longer screws, 2 additional CAMs with set screws, support bracket and a few wire ties.

If Auxiliary Switches are being added to the ProVolt Modulating Actuator, these switches will mount to the Motor Switch Bracket. This kit will include 2 wired switches, standard switch screws, 2 additional CAMs with set screws and a few wire ties.



Switch Support Bracket

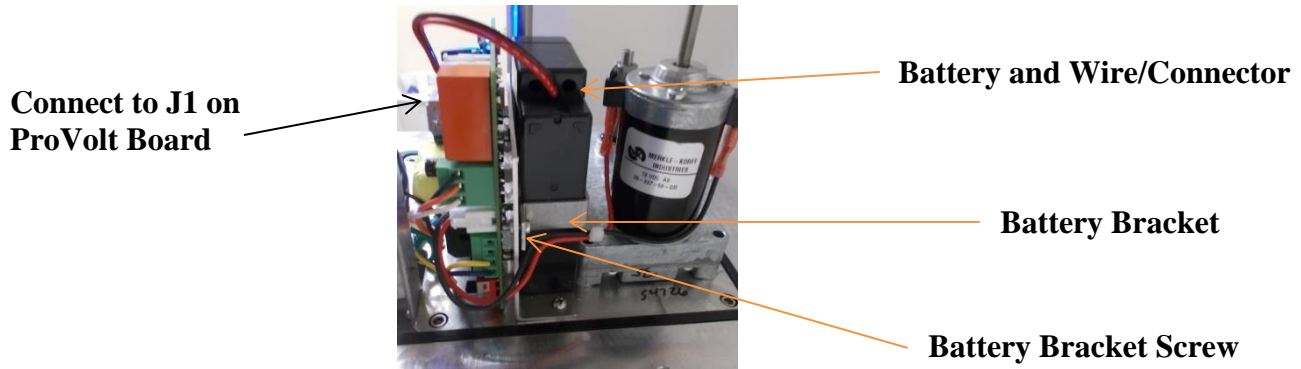
2 Auxiliary Switches

2 Motor Limit Switches

ProVolt Actuator Auxiliary Switch Location

OPTIONAL BATTERY INSTALLATION:

The Optional Battery can be added in the field or replaced if the original battery has reached end of life.



When installing or replacing a battery in the ProVolt Actuator, follow the below steps:

- 1) Turn OFF all power to the ProVolt Actuator.
- 2) Remove the Actuator Cover screws and remove the Actuator Cover.
- 3) Remove the new battery from the shipping packaging and check for damage to the battery case, wiring and connector. DO NOT install a battery if there is obvious damage to these components!
- 4) Loosen the Battery Bracket Screw to pull the Battery Bracket out away from the ProVolt Board Support Bracket.
- 5) Slide the new Battery down into the Battery Bracket opening and re-tighten the Battery Bracket Screw to secure the battery in place.
- 6) Plug the 2 pin Battery Wire/Connector into J1 on the ProVolt Board. The Green LED on the ProVolt Board should illuminate. If the Red LED lights, the battery may need a slight charge.
- 7) Turn the Main Power back ON to the ProVolt Actuator and see that the Green or Red LED will turn OFF and the Blue LED will illuminate.
- 8) Turn the Main Power OFF.
- 9) Carefully replace the Actuator Cover without pinching any wires and tighten the Cover Screws to torque.

NOTE: Care should be used whenever using a battery source for power. Sealed Lead Acid (SLA) batteries are designed to be mounted in any position without leaking. Take great care NOT to pinch or crimp the battery wires with the Actuator Cover or brackets as this may cause damage and /or arcing and short out the battery.

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 fit after the cover is secured. After securing the cover screws to the proper torque (see chart – 75 in/lbs.) check the fit between the cover and the base is 0.00” – no gaps!
- 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

31MAY22 – Added PV-10 to Title Page. Added disclaimer of possible damage to Specifications Page. Changed feeler gauge from 0.002” to 0.0015”. Added “1/2” NPT conduit description to Wiring Section. Technical contact information added and torque requirements for terminal screws. Modified/added topics to the Specifications Section. Modified Product Description Section – added for clarity. Added SPARE PARTS Section.

17NOV22 – Changed 2 wiring diagrams to show the board modifications for 2 input connectors. New PCB pictures to show the 2 input connectors rather than 1 (original). Removed the note of using a feeler gauge to check reassembly of the NEMA 7 cover – added “0.00” no gaps”. Updated Specifications Section – Motor Locked Rotor Amps.

22FEB23 – Added “Class 1 Wiring” note to Specifications and Customer Electrical Connections sections. Modified heater power to 15 Watts. Added Manual part number (MPV-220601).

17MAR23 – Changed product title to **ProVolt**, added ISO bolt circle dimensions to drawing, spelled out DVM, added brake hub installation instructions and changed “clearance” to “fit” in NEMA 7. Modified Table of Contents – add page.

SPARE PARTS:

The ProVolt Series Actuators require very little maintenance. If a failure should occur, a list of field replaceable parts is shown in the chart below. When calling for spare parts, please include your Model Number, Serial Number, Actuator Description, Part Needed and Date of Installation.



TE5 Square Fuse



0.8AHr Battery, 12VDC

If the unit is not working and it is suspected that there is a failure in the Positioner Board, the ProVolt Actuator needs to be sent back to Indelac for repair and re-calibration.

Spare Part	Indelac Part Number
CLOSE Switch with wires	24000-PVC
OPEN Switch with wires	24000-PVO
Battery, 0.8AHr with connector	32001
Fuse, 4A, 250V, Square TE5 – Power	46116
Fuse, 2.5A, 250V, Square TE5 – Motor	46115
ProVolt PCB, Standard Board	22168
ProVolt PCB, Modulating Board	22195
#25020 Heater Kit, with screws	90030
#45014 12vdc Power Off Brake Kit	90031

TESTING AND TROUBLESHOOTING:

Battery Condition Test

- 1) Remove the Mains power and verify that the Green LED illuminates. If it does, then the battery is properly charged and ready for operation.
- 2) If the Red LED illuminates, the battery is low.
- 3) Apply Mains power to the actuator and verify that the Blue LED illuminates.
- 4) Wait 8 hours and repeat by removing the external power.
- 5) If the Green LED illuminates, the battery is good and is charged.
- 6) If the Red LED illuminates, or is OFF, the battery is bad and needs to be replaced.

Power Test ****DO NOT CHANGE ANY SWITCH SETTINGS WITH THE POWER ON****

- 1) Apply Mains power to the actuator. The Blue LED should illuminate.
- 2) If there is no Blue LED, check that the Mains power is ON & the breaker is ON.
- 3) Next, verify that the power is correctly connected to the actuator and the wires are tight in the input connector.
- 4) Verify that the 115/24 switch on the ProVolt Board is in the proper position for the incoming voltage being applied.
- 5) If still no Blue LED, check the 4.0A on board fuse in the Actuator.
- 6) If the fuse is blown, replace the fuse.
- 7) If the fuse is good, there is a problem with the ProVolt Board and it will need to be replaced.

DC Modulating Board LED Fault Conditions

The Green and Red LEDs on the DC Modulating Board will give the user Fault Status under certain conditions. See the chart below:

Green	Red	Condition
-	Flash	Limit Switch 1 disconnected
Flash	-	Limit Switch 2 disconnected
Blink	OFF	Feedback Pot too Low (<0.25V)
OFF	Blink	Feedback Pot too High (>4.75V)
Blink	Blink	Low Input Voltage (<10V)
ON	ON	Input Voltage Too High (>30V)

***Flash = very fast; Blink = longer, slow*

If one of the Limit Switches is **disconnected**, check the jumper wiring to terminals #6-8 and #6-7 on the Modulating board – make sure the wires and terminal screws are tight. (See Modulating Wiring Diagram)

If the Feedback Pot is too **Low** or too **High**, the Actuator is Out of Calibration and the unit needs to be re-calibrated per the above DC Modulating Calibration Steps.

If the Main DC Power to the DC Modulating board drops **below 10vdc** or goes **above 30vdc**, the Fault Condition will be indicated and the Input Power needs to be corrected. Check the voltage from the ProVolt Board to the DC Modulating Board.

Frequently Asked Questions

SYMPTOM	PROBLEM	SOLUTION
Actuator does not respond to Command Signal	Power not on	Turn ON Power
	Actuator wired incorrectly	Check wiring diagram & re-wire
	Wrong voltage	Check power supply & make appropriate changes
	Motor Fuse blown	Replace 2.5A motor fuse
	Actuator and valve in opposite positions when actuator was mounted	Remove actuator , rotate 90 degrees & re-mount
	Input Power fuse blown	Replace with proper value fuse
	Input signal wires not tight in terminals	Tighten terminal block screws
	Bad Brake – Locked Up	Remove brake hub & try to run without brake. If unit runs, replace the brake.
	Modulating Unit out of Calibration	Follow the Modulating Actuator re-calibration steps
Actuator will not OPEN or CLOSE completely	DC Modulating Board not set up Properly	Check DC Modulating Board DIP Switch Settings for proper Command Signal Input – reset switches
	Travel limits set incorrectly	Reset CAMs and /or adjust the SPAN and ZERO pots on the DC Controller Board
	Valve Torque is too high for actuator	Install correct size actuator
	Modulating Unit out of Calibration	Follow the Modulating Actuator re-calibration steps
Valve Oscillates	Mechanical Stops limiting travel	Remove the stops: CAUTION – Do not remove any part required for the proper operation of the actuator
	Valve torque is too high for actuator	Install correct size actuator
	Actuator installed on butterfly valve	Install a motor brake
	Motor brake not locking motor at end of travel	Check brake wiring for proper connection or replace brake
	Set screw in brake hub is loose	Reset brake hub and tighten down set screw
Motor Runs, but Output Shaft does not rotate	Modulating Unit Deadband is set too tight	Adjust DC Modulating Board Deadband Pot to loosen up deadband setting
	Internal gears damaged or broken gear key	Contact Indelac Controls or nearest distributor
Modulating Unit does not complete full travel but board LEDs are still ON	Modulating Unit is out of Calibration	Follow the Modulating Actuator re-calibration steps
	Feedback potentiometer or it's gear has come loose	Tighten down the pot gear and re-calibrate the unit

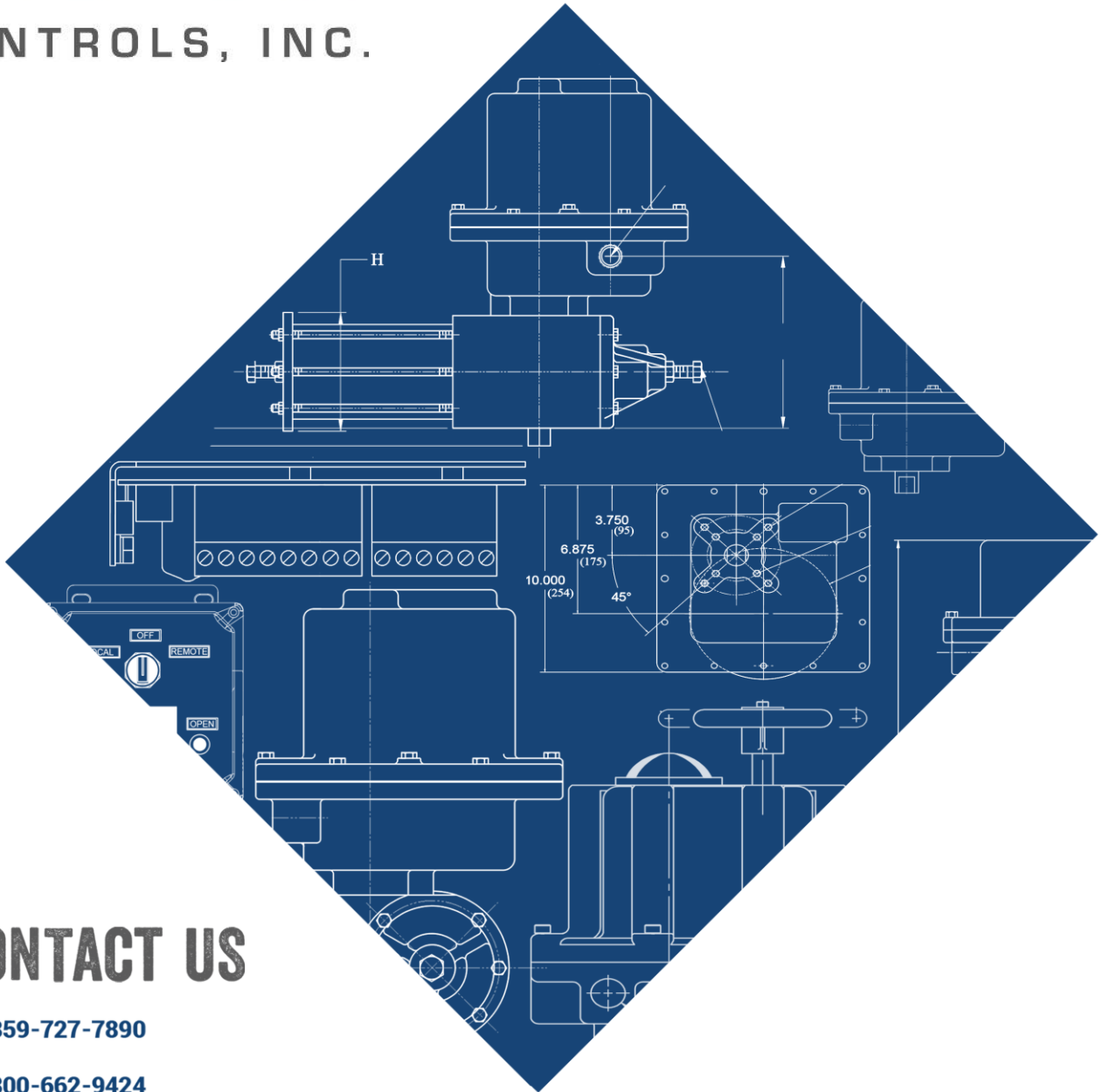
If you require Technical Assistance on any of our actuator or control products, please contact your local distributor.

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NOTES

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