iVQ-E to S Range Adjustment and Calibration Manual

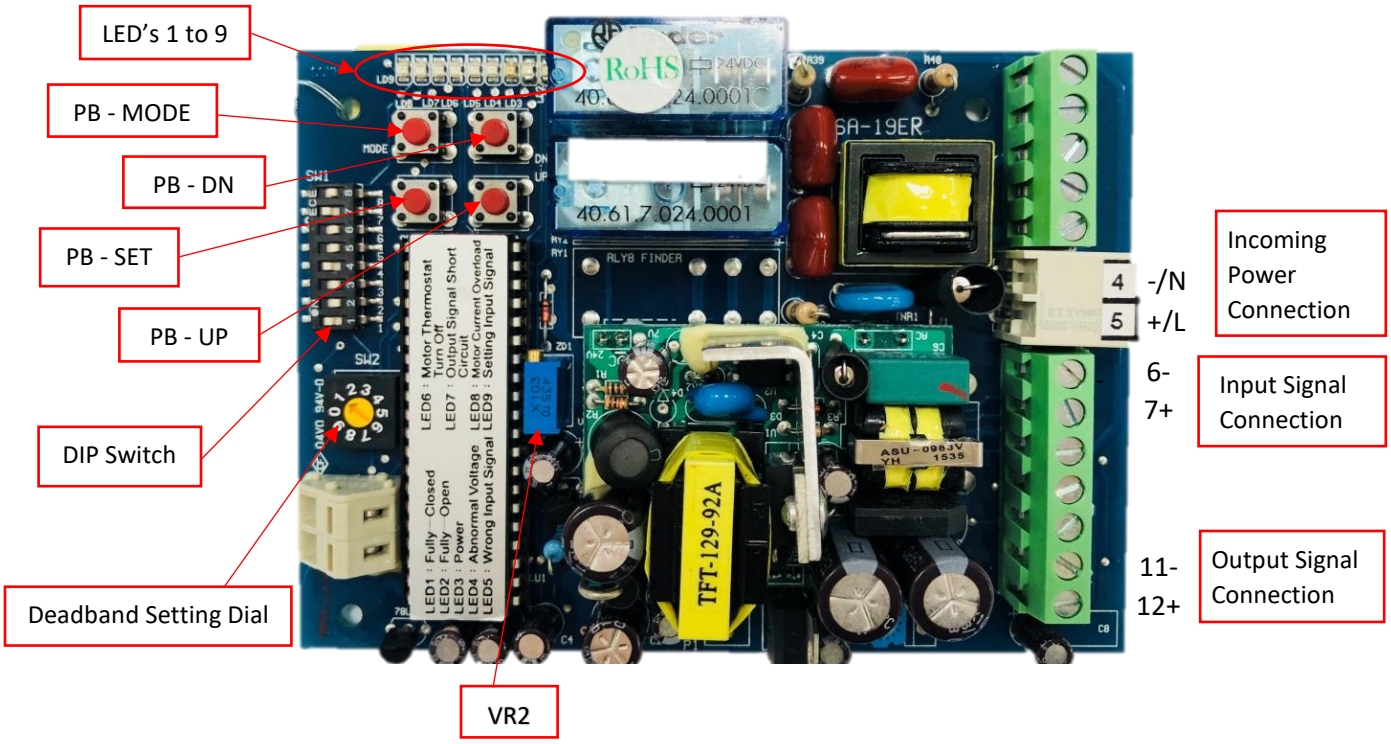
1. Modulating Control and Position Feedback Option Supplied:

This manual provides necessary information for calibrating the modulating control board and making any fine tune adjustments to iVQ-E to R Range actuators. Each unit is shipped with initial calibration and factory settings complete for a 0° to 90° operation.

If changes were made to the OPEN/CLOSE (CCW/CW travel) limit switches or new settings wish to be made, the following steps must be followed for proper calibration of the unit:

1. Confirm actuator setup via the “DIP Switch Setting Chart”.
2. Confirm actuator performance via the “Deadband Setting Dial”.
3. Reset the potentiometer via “Potentiometer (VR) Adjustment”.
4. Reset the OPEN and CLOSE positions via “OPEN/CLOSE Calibration Procedure”.
5. Also refer to the “Troubleshooting Chart” at the end of this manual for additional help.

Modulating Control and Position Feedback Board Layout

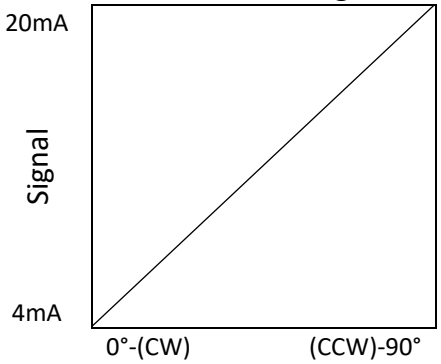


DIP Switch Setting Chart (Factory Setting is shown in RED)

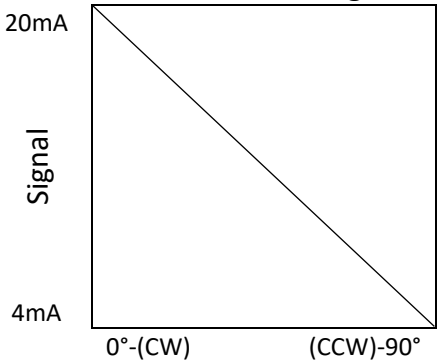
Switches 1 and 2 correspond to the input signal setting, switches 3, 4, and 5 correspond to the output signal setting, and switches 6, 7, and 8 correspond to the actuator command settings. If any changes are made, turn OFF power and restart to activate the changes.

DIP Switch Setting Options								
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**Functions**
ON	**OFF**							4-20mA Signal Input
OFF	**OFF**							1 -5V Signal Input
OFF	**ON**							2-10V Signal Input
		OFF	**ON**	**OFF**				4-20mA Signal Output
		ON	**OFF**	**ON**				2-10V Signal Output
					OFF			Direct Acting Mode (See graph)
						ON	**ON**	Stay in place on Loss of Input Signal
						OFF	**ON**	CW on Loss of Input Signal
						ON	**OFF**	CCW on Loss of Input Signal
					ON			Reverse Acting Mode (See graph)
						ON	**ON**	Stay in place on Loss of Input Signal
						OFF	**ON**	CCW on Loss of Input Signal
						ON	**OFF**	CW on Loss of Input Signal

Direct Acting



Reverse Acting



Deadband Setting Dial

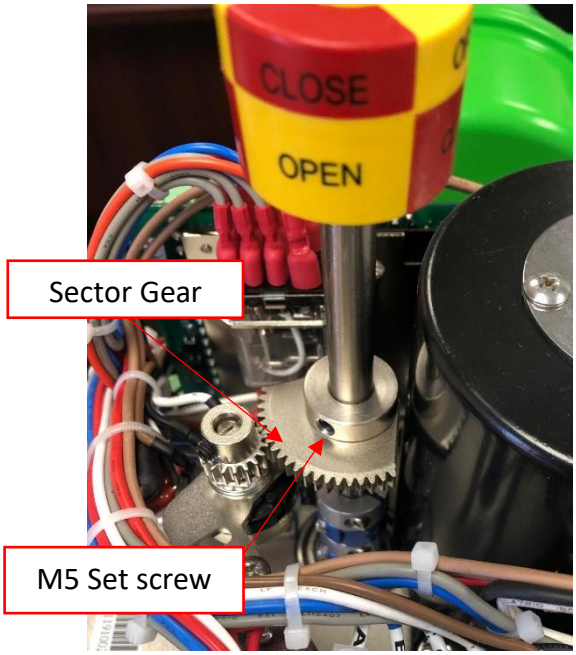
The dial rotates clockwise from 1 through 0, 1 being the highest sensitivity rating and 0 being the lowest. As you increase the sensitivity, you are increasing the amount that the actuator reacts to an input signal change. The factory setting is typically set to 3.

Potentiometer (VR) Adjustment

Adjustment of the potentiometer of VR gear is typically NOT required! Please avoid adjustment if necessary. If you believe adjustment is required call iVact service to confirm. After confirming, please follow the procedure:

Adjustment The main potentiometer (also referred to as VR or main Variable Resistor) is factory set to operate 90°. If adjustment is required, it should be adjusted once the OPEN/CLOSE limits are set, then move the actuator to the fully closed position.

- For ALL Units – Loosen the set screw on the sector gear and rotate fully clockwise. Re-tighten the set screw.



OPEN/CLOSE Calibration Procedure

If travel cams were modified from factory settings, a re-calibration procedure must be followed to ensure that the actuator will work correctly. (In the following procedure, it is assumed that the actuator is in the fully closed CW position and the DIP switches are set to the factory setting as noted above).

Refer to the Modulating Control Board Layout above for component locations:

- Use the Pushbuttons on the Modulating Control Board to set the Open and Close position.
- Refer to the chart below for the description of each LED.

Control Board LED Description

Indication Light Number	Description	Indication Light Number	Description
LD1	Moving CW-CLOSE	LD6	Motor Thermostat Tripped
LD2	Moving CCW-OPEN	LD7	Output Signal Short Circuit
LD3	Power ON	LD8	Motor Current Excessive
LD4	Abnormal Voltage	LD9	Setting Mode
LD5	Wrong Input Signal		

Note: The OPEN/CLOSE limits must be set prior to the calibration procedure. Please refer to the Installation and Operation Manual to complete the OPEN/CLOSE limit setting with the cams and limit switches prior to following these steps.

- Press the “SET” button for 2 seconds until LD9 is lit, then release. This is the Setting mode.

- CCW Setting:
    - Press and hold the “UP” button until the actuator moves to the fully CCW position.
    - LD2 is lit while holding the “UP” button.
    - Apply a 20mA input signal. (Apply 4mA signal if Dip Switch Setting #6 is set to ‘ON’)
    - Press the “MODE” button for 3 seconds or until you see an LED above the buttons flashing. Repeat this a few times to ensure the board memory is updated and saved. CCW setting is now complete.

- CW Setting:
    - Press and hold the “DN” button until the actuator moves to the fully CW position.
    - LD1 is lit while holding the button.
    - Apply a 4mA input signal. (Apply 20mA signal if Dip Switch Setting #6 is set to ‘ON’)
    - Press the “MODE” button for 3 seconds or until you see an LED above the buttons flashing. Repeat this a few times to ensure the board memory is updated and saved. CW setting is now complete.

- Press the “SET” button to exit the Setting mode.

- Check output signal at the fully CCW position if Dip Switch Setting #6 is set to ‘OFF’. (Direct Acting)
    - To adjust the value of the output, rotate screw head of VR2 until desired value is reached.

- Check output signal at the fully CW position if Dip Switch Setting #6 is set to ‘ON’. (Reverse Acting)
    - To adjust the value of the output, rotate screw head of VR2 until desired value is reached.

- Refer to the Control Board LED Checklist below if the actuator is not functioning.

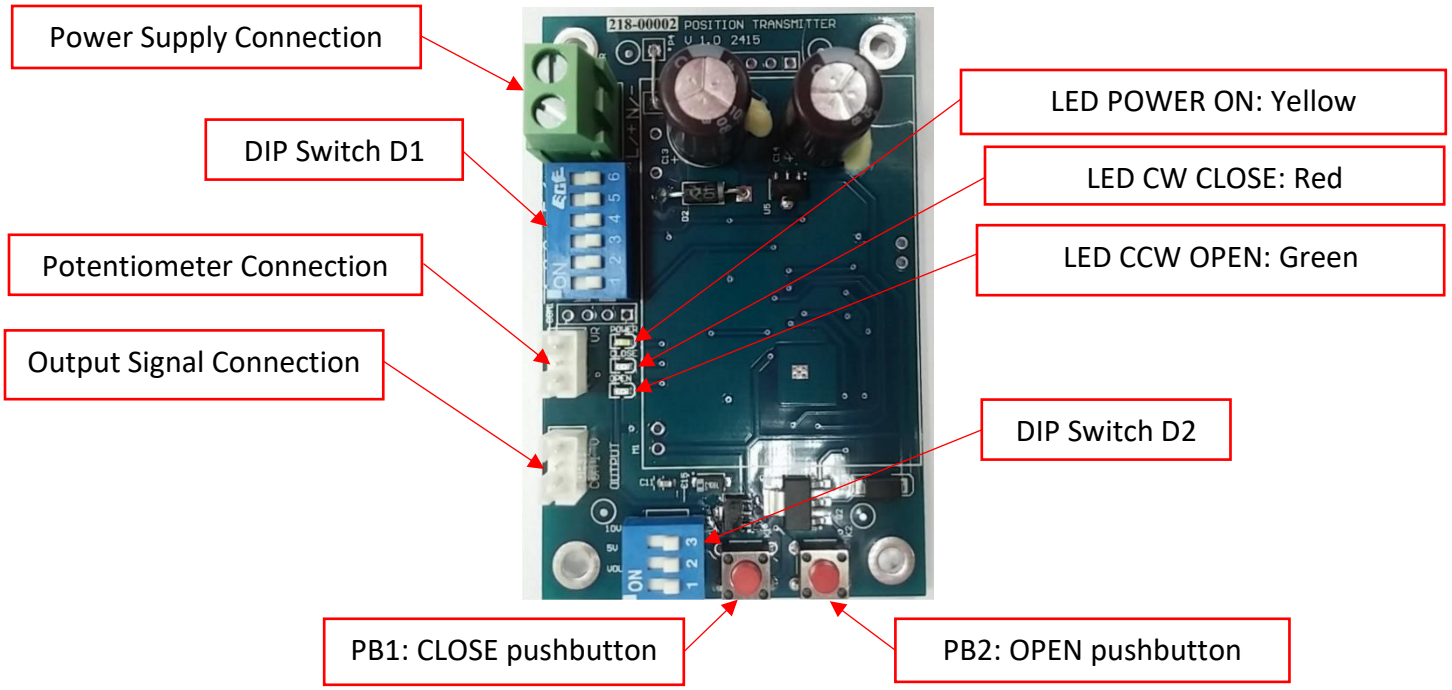
Control Board LED Checklist

Note: During normal operation, LED's 4-9 are not lit. If any are flashing or lit, refer to chart below to troubleshoot.

Indication Light Number	Problem	Remedies
LED3	It's not lit	Check power supply and verify wiring.
		Board may be damaged. Send back to factory for inspection.
LED4	Flashing or lit (Applies to 24V models only)	Confirm that the voltage is within nominal operating range (20.4-26.4V DC).
LED5	Flashing or lit	Confirm that the input signal is the same as dip switch setting. Refer to "Dip Switch Setting" section in this manual.
		Check that setting is correct; might be set to 2-10V input, but supply is 4-20mA.
		The setting is set to 2-10V, but the input signal is over 13.5V.
LED6	Flashing or lit means Motor thermostat turns OFF	Frequency is too high for rated duty cycle.
		Motor thermostat is not connected.
LED7	Flashing: Output signal short circuit	Check wiring on terminals #11 and #12, should be: #11 "-" and #12 "+".
	Lit: The 2-10V input signal is not connected properly	Check wiring on terminals #6 and #7, should be: #6 "-" and #7 "+".
LED8	Flashing or lit means that motor current is excessive	Frequency is too high for rated duty cycle.
		Check the load.
		The motor rotor is jammed.
LED9	Flashing or lit means that it is in setting mode	Press "SET" once to exit the settings menu.

2. Position Feedback (Output Signal) Option Supplied:

Position Feedback Board Layout

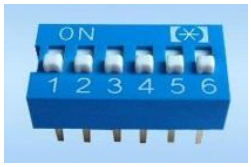


Position Feedback Instructions

For this option, the following steps need to be performed:

1) Confirm the required output signal via the DIP switch settings below:

DIP Switch Setting Chart for D1



⬆ ON

⬇ OFF

	1	2	3	4	5	6
Default	OFF	ON	OFF	OFF	OFF	OFF
0-20mA	ON	OFF	OFF	OFF	OFF	OFF
4-20mA	OFF	ON	OFF	OFF	OFF	OFF
0-5V	OFF	OFF	ON	OFF	OFF	OFF
1-5V	OFF	OFF	OFF	ON	OFF	OFF
0-10V	OFF	OFF	OFF	OFF	ON	OFF
2-10V	OFF	OFF	OFF	OFF	OFF	ON

DIP Switch Setting Chart for D2

⬆ ON

⬇ OFF

	1	2	3
Default	OFF	OFF	OFF
0-20mA/4-20mA	OFF	OFF	OFF
0-5V/1-5V	ON	ON	OFF
0-10V/2-10V	ON	OFF	ON

2) To enter the setting mode, press and hold ‘PB1’ and ‘PB2’ simultaneously, ‘LED CCW OPEN’ and ‘LED CW CLOSE’ will begin to flicker.

3) Operate the actuator to the fully CCW OPEN position and press ‘PB2’, ‘LED CCW OPEN’ will flicker rapidly for about 2 seconds. The fully CCW OPEN position is now set.

4) Check output signal at terminals 8 & 9 or terminals 8 & 10 depending on the DIP Switch setting selected.

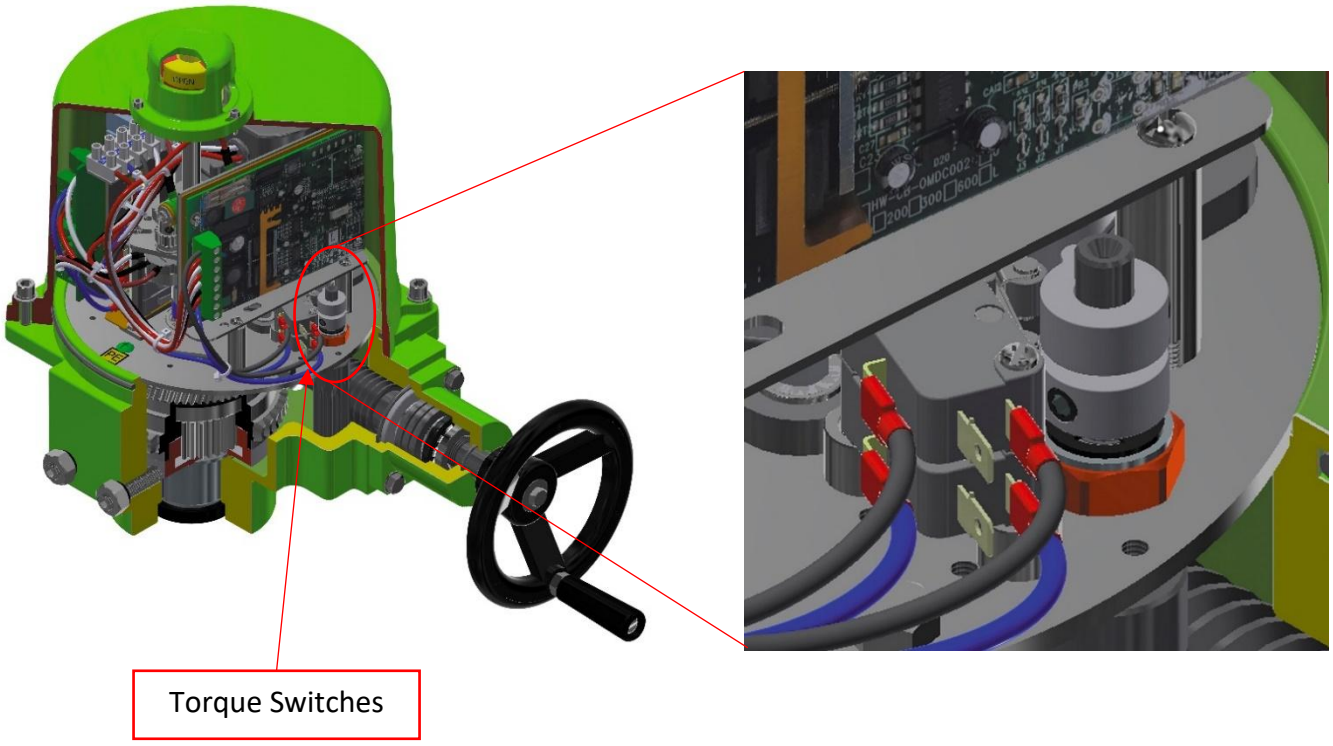
5) Operate the actuator to the fully CW CLOSE position and press ‘PB1’, ‘LED CW CLOSE’ will flicker rapidly for about 2 seconds. The fully CW CLOSE position is now set.

6) Check output signal at terminals 8 & 9 or terminals 8 & 10 depending on the DIP Switch setting selected.

7) Press and hold ‘PB1’ and ‘PB2’ simultaneously to exit the setting mode.

3. Torque Switches Option Supplied:

See the illustration below showing where the torque switches are located inside the unit. These are set at the factory and cannot be adjusted. If, for some reason, these settings were modified, please contact our factory for further instructions.



Troubleshooting Chart

Problem	Remedies
Modulating controller is not functioning.	Faulty main potentiometer (VR). Replace VR.
	Remove the input signal wires. Operate actuator to the fully closed position and readjust the VR. Refer to "Potentiometer (VR) Adjustment" section of this manual.
	May be a wrong input signal. Review "DIP Switch Setting Chart" section in this manual.
	Faulty modulating board. Must be sent back to factory for inspection.
The actuator is running open and close, but it is not modulating.	The signal is reversed or there is a signal failure.
	Improper wiring. Check that terminal #8 is hooked up to "-" and terminal #9 is hooked up to "+".
The indication lights are flashing after the operating check has been completed.	There is an incorrect setting. Review the "Open/Close Calibration Procedure" to determine the problem.