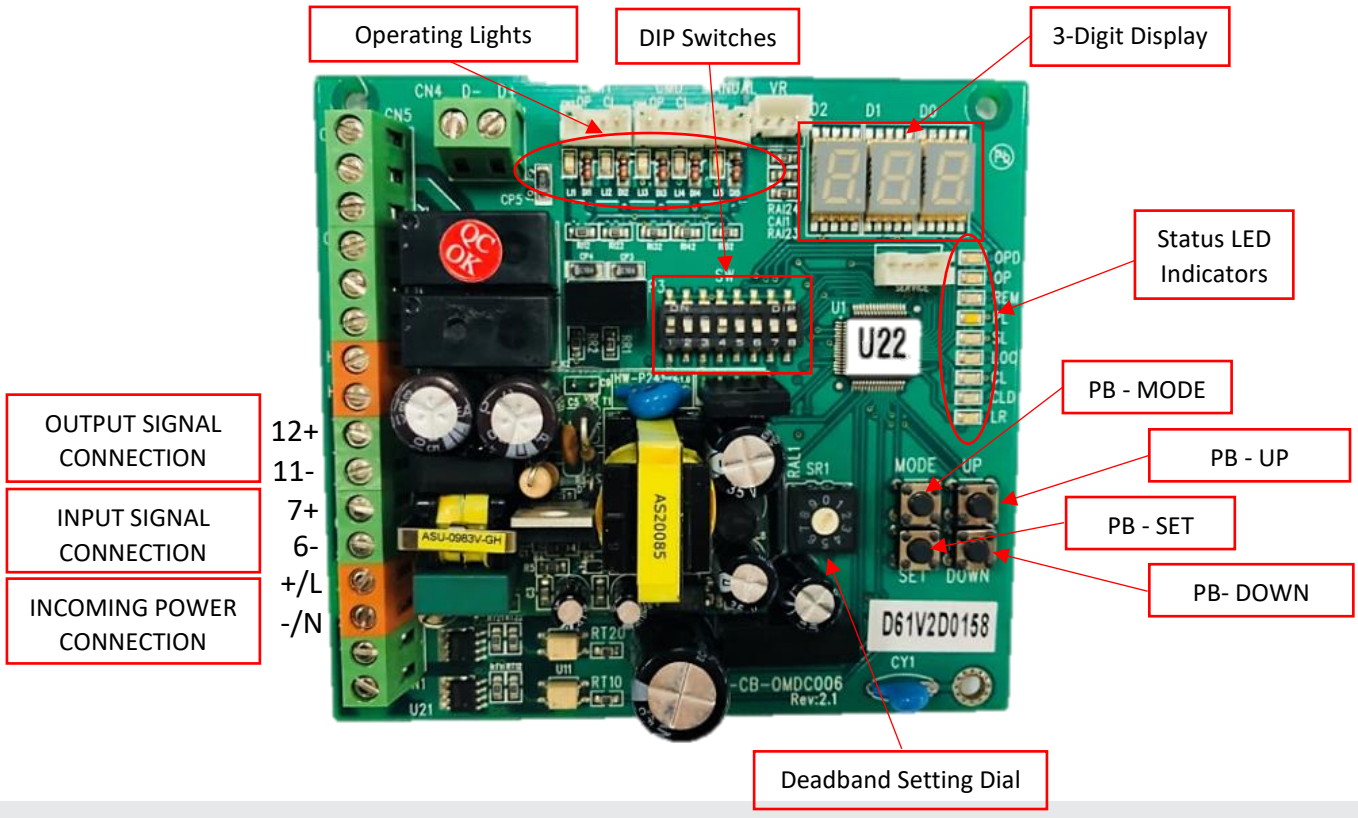
iVL Range Adjustment and Calibration Manual

This manual provides necessary information for calibrating the modulating control board and making any fine tune adjustments to iVL-A to D Range actuators. Each unit is shipped from the factory with initial calibration complete for a full stroke operation.

If changes or new settings wish to be made, the following should be followed for proper calibration of the unit:

- Confirm actuator setup via the “DIP Switch Setting Chart”.
- Confirm actuator performance via the “Deadband Setting Dial”.
- If required, reset the Upward (Retracted) and Downward (Extended) positions on travel LIMIT. This is a necessary step if the valve travel cannot be setup automatically via maximum THRUST output of actuator.
- Perform the Fine-Tuning Adjustments.
- Refer to the “Control Board Alarm Message Screen” or the “Troubleshooting Chart” at the end of this manual for additional help.

Modulating Control Board Layout

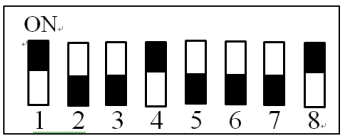


Modulating Control Board Description

Operating Lights

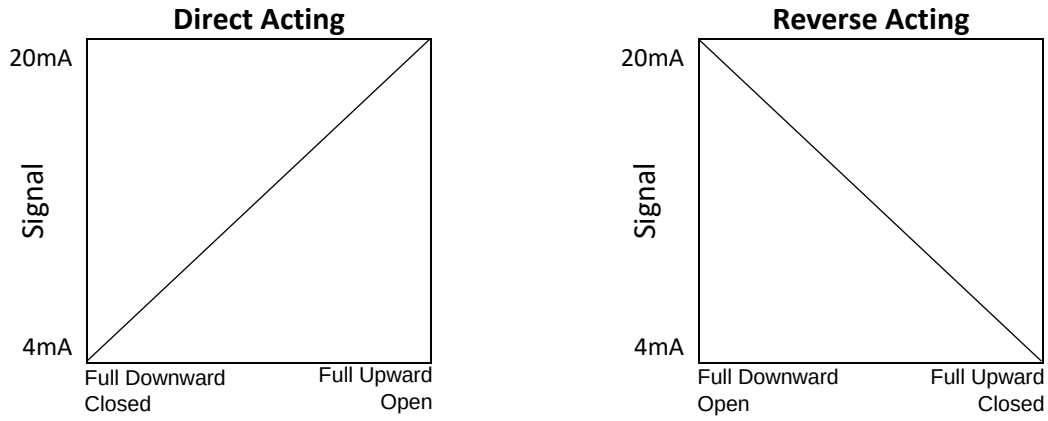
- These are indication LED's that will light up during certain functions: Fully-Open position, Fully-Closed position, Auto mode, and Manual mode.

DIP Switches (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 - 4ma will extend downward (See graph)
						ON	**ON**	Stay in place on Loss of Input Signal
						OFF	**ON**	Close Valve on Loss of Input Signal (Extend / Move Downward)
						ON	**OFF**	Open Valve on Loss of Input Signal (Retract / Move Upward)
					ON			Reverse Acting Mode – 4ma will retract upward (See graph)
						ON	**ON**	Stay in place on Loss of Input Signal
						OFF	**ON**	Close Valve on Loss of Input Signal (Retract / Move Upward)
						ON	**OFF**	Open Valve on Loss of Input Signal (Extend / Move Downward)



3-Digit Display

- During normal operation, this screen serves as a digital readout showing the valve position as a percentage from 0% to 100%. When the MODE-PB is pressed, the user can navigate through a list of menu codes: AL_ Par LoC I_o AUo then by pressing the SET-PB at any of these menu codes, the user will enter into a sub-menu or access other information. For a list of each menu code and description, refer to the "3-Digit Display Menu Codes" at the end of this manual.

Status LED Indicators

Indication Light Number	Description	Indication Light Number	Description
OPD	Fully Open (Retracted) / Upward Position	LOC	Local Control Mode
OP	Moving in Open (Retracting) / Upward Direction	CL	Moving in Closed (Extending) / Downward Direction
REM	Remote Control Mode	CLD	Fully Closed (Extended) / Downward Position
PL	Alerting Signal	LR	MCU Indication
SL	Setting Mode		

Pushbuttons

- Pressing the MODE-PB allows the user to access a menu that is used for setup and commissioning. The SET-PB is typically used as an <enter> button. The UP-PB and DOWN-PB allow the user to scroll through the menu and they are also used to move the actuator up and down during setup and commissioning.

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 7.

Quick Setup

The procedure below will guide you through an automatic setup of the OPEN/UPWARD and CLOSED/DOWNWARD positions. This is achieved by automatically sensing the actuator maximum THRUST in both the OPEN/UPWARD and CLOSED/DOWNWARD direction. If you wish to calibrate the OPEN/UPWARD and CLOSED/DOWNWARD positions by travel LIMIT, you can do this as a manual setup. Refer to the next section below.

NOTE: WITH AN ON/OFF SERVICE ACTUATOR (NON-MODULATING TYPE) SETUP IS VIA AUTOMATIC SENSING OF MAXIMUM THRUST.

In the following procedure, it is assumed that the actuator is in the fully downward CLOSED position and the DIP Switches are set to the factory setting. Refer to the "iVL Range Adjustment and Calibration Manual" to modify the settings.

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

- Press MODE-PB five (5) times until the display reads AUo
- Press and hold the SET-PB for approx. 5 seconds until the "LOC" amber indication light comes on, entering the Auto Set mode.
- The actuator will now perform a full stroke, OPEN/UPWARD then CLOSED/DOWNWARD. When the Auto Set is completed, the "LOC" indication light will turn off and the actuator will stop running.
- The travel setting is now complete.

Open/Close (Retracted-Upward/Extended-Downward) DIRECT ACTING ONLY Calibration Procedure

In the following procedure, it is assumed that the actuator is in the fully-CLOSED (Extended) downward position and the DIP switches are set to the factory default settings as noted in the DIP switch table above. Refer to the Modulating Control Board Layout above for component locations.

- When setting the fully-OPEN (Retracted) Upward position, there is an option to set the fully-OPEN (Retracted) upward position on THRUST or on travel LIMIT. Default is set to (Retract) move upward on THRUST.
- Setting fully-OPEN (Retracted) upward position on LIMIT.
- Press MODE-PB until the display reads [P][a][r] then press SET-PB to enter the setting sub-menu.
- Using the UP-PB or DOWN-PB, scroll through the menu until the display reads [o][P][L] then press SET-PB. The display will read [0][0][0] which refers to a THRUST setting. In order to change this setting so that the actuator OPENS (Retracts) moves upward on LIMIT, press the SET-PB and hold for approx. 5 seconds until the numbers are flashing. Press the UP-PB until the display reads [0][0][1] which changes the setting so that the actuator will OPEN (Retract) move upward on LIMIT as opposed to THRUST. Press the SET-PB to save this setting.
- Press the MODE-PB until the display reads [L][o][C] then press the SET-PB and hold for about 5 seconds to enter the local control mode. You will notice that the amber "LOC" status LED indicator will enable, letting you know that you are in the local control mode.
- Press the UP-PB and hold in place. The actuator will (Retract) move upwards.
- If the setting is on LIMIT, release the UP-PB when you reach the desired fully-OPEN (Retracted) upward position.
- Locate the lower switch, (see photo 1 below). Using a screwdriver, press the arm of the lower switch (see photo 2 below), and while holding it compressed, press the SET-PB. The display will now read [1][0][0] The fully-OPEN (Retracted) upward position is now set.
- Press the MODE-PB. The display now reads [d][S][P] . This ends the upward position calibration procedure based on a travel LIMIT setting.
- Otherwise, if a THRUST setting is selected, continue keeping the UP-PB depressed to automatically locate the fully-OPEN (Retracted) upward position and trip on maximum THRUST of the actuator.

Photo 1

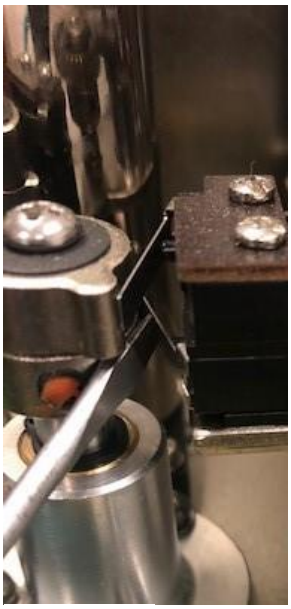


Photo 2

Photo 3

- Setting fully-CLOSED (Extended) downward position on LIMIT.
- Press MODE-PB until the display reads [P][a][r] then press SET-PB to enter the setting sub-menu..
- Using the UP-PB or DOWN-PB, scroll through the menu until the display reads [C][o][L] then press SET-PB. The display will read [0][0][0] which refers to a THRUST setting. In order to change this setting so that the actuator CLOSE (Extends) moves downward on LIMIT, press the SET-PB and hold for approx. 5 seconds until the numbers are flashing. Press the UP-PB until the display reads [0][0][1] which changes the setting so that the actuator will CLOSE (Extend) move downward on LIMIT as opposed to THRUST. Press the SET-PB to save this setting.
- Press the MODE-PB until the display reads [L][o][C] then press the SET-PB and hold for about 5 seconds to enter the local control mode. You will notice that the amber "LOC" status LED indicator will enable, letting you know that you are in the local control mode.
- Press the DOWN-PB and hold in place. The actuator will (Extend) move downwards.
- Release the DOWN-PB when you reach the desired fully-CLOSED (Extended) downward position.
- Locate the upper switch, (see photo 1 above). Using a screwdriver, press the arm of the upper switch (see photo 3 above), and while holding it compressed, press the SET-PB. The display will now read [0][0][0]. The fully-CLOSED (Extended) downward position is now set.
- Press the MODE-PB. The display now reads [d][S][P]. This ends the downward calibration procedure based on a travel LIMIT setting.

- Otherwise if a THRUST setting is selected, continue keeping the DOWN-PB depressed to automatically locate the fully-CLOSED (Extended) downward position and trip on maximum THRUST of the actuator.

Close/Open (Retracted-Upward/Extended-Downward) REVERSE ACTING ONLY Calibration Procedure

In the following procedure, it is assumed that the actuator is in the fully-OPEN (Extended) downward position and the DIP switches are set to the reverse acting mode as noted in the table above. Refer to the Modulating Control Board Layout above for component locations.

- When setting the fully-CLOSED (Retracted) Upward position, there is an option to set the fully-CLOSED (Retracted) Upward position on THRUST or on travel LIMIT. Default is set to (Retract) move upward on THRUST.

- Setting fully-CLOSED (Retracted) Upward position on LIMIT.

- Press MODE-PB until the display reads [P][a][r] then press SET-PB to enter the setting sub-menu.

- Using the UP-PB or DOWN-PB, scroll through the menu until the display reads [C][o][L] then press SET-PB. The display will read [0][0][0] which refers to a THRUST setting. In order to change this setting so that the actuator CLOSES (Retracts) moves upward on LIMIT, press the SET-PB and hold for approx. 5 seconds until the numbers are flashing. Press the UP-PB until the display reads [0][0][1] which changes the setting so that the actuator will CLOSE (Retract) move upward on LIMIT as opposed to THRUST. Press the SET-PB to save this setting.

- Press the MODE-PB until the display reads [L][o][C] then press the SET-PB and hold for about 5 seconds to enter the local control mode. You will notice that the amber “LOC” status LED indicator will enable, letting you know that you are in the local control mode.

- Press the UP-PB and hold in place. The actuator will (Retract) move upwards.

- If the setting is on LIMIT, release the UP-PB when you reach the desired fully-CLOSED (Retracted) upward position.

- Locate the lower switch, (see photo 1 above). Using a screwdriver, press the arm of the lower switch (see photo 2 above), and while holding it compressed, press the SET-PB. The display will now read [0][0][0] The fully-CLOSED (Retracted) upward position is now set.

- Press the MODE-PB. The display now reads [d][S][P] . This ends the upward calibration procedure based on a travel LIMIT setting.

- Otherwise if a THRUST setting is selected, continue keeping the UP-PB depressed to automatically locate the fully-CLOSED (Retracted) upward position and trip on maximum THRUST of the actuator.

- Setting fully-OPEN (Extended) downward position on LIMIT.
- Press MODE-PB until the display reads [P][a][r] then press SET-PB to enter the setting sub-menu.
- Using the UP-PB or DOWN-PB, scroll through the menu until the display reads [o][P][L] then press SET-PB. The display will read [0][0][0] which refers to a THRUST setting. In order to change this setting so that the actuator OPENS (Extends) moves downward on LIMIT, press the SET-PB and hold for approx. 5 seconds until the numbers are flashing. Press the UP-PB until the display reads [0][0][1] which changes the setting so that the actuator will OPEN (Extend) move downward on LIMIT as opposed to THRUST. Press the SET-PB to save this setting.
- Press the MODE-PB until the display reads [L][o][C] then press the SET-PB and hold for about 5 seconds to enter the local control mode. You will notice that the amber "LOC" status LED indicator will enable, letting you know that you are in the local control mode.
- Press the DOWN-PB and hold in place. The actuator will (Extend) move downwards.
- Release the DOWN-PB when you reach the desired fully-OPEN (Extended) downward position.
- Locate the upper switch, (see photo 1 above). Using a screwdriver, press the arm of the upper switch (see photo 3 above), and while holding it compressed, press the SET-PB. The display will now read [1][0][0]. The fully-OPEN (Extended) downward position is now set.
- Press the MODE-PB. The display now reads [d][S][P] . This ends the downward calibration procedure based on a travel LIMIT setting.
- Otherwise if a THRUST setting is selected, continue keeping the DOWN-PB depressed to automatically locate the fully-OPEN (Extended) downward position and trip on maximum THRUST of the actuator.

Fine Tuning Adjustments (Actuator is in the Fully-CLOSED Downward Position) DIRECT ACTING

- Input Signal Setting for fully-CLOSED (Downward) position:
  - Press MODE-PB until [I][_][o] appears, then press SET-PB to enter the setting sub-menu.
  - Press DOWN-PB until [2][r][l] appears, then hold the SET-PB until [2][r][l] is flashing.
  - Supply the input signal according to the setting on the DIP switch. 4mA or 2V.
  - Press SET-PB once and MODE-PB twice to complete the input signal setting for the fully-CLOSED (Downward) position.

- Output Signal Setting for fully-CLOSED (Downward) position:
  - Attach an ammeter or voltmeter to the output signal connection. (terminals 11 and 12)
  - Press MODE-PB until [I][_][o] appears, then press SET-PB to enter setting sub-menu.
  - Adjust with UP-PB and DOWN-PB until [2][F][o] appears.
  - Hold the SET-PB down for about 3 seconds.
  - Adjust the output value with UP-PB and DOWN-PB until the value is correct.
  - Press SET-PB once and MODE-PB twice to complete the output signal setting for the fully-CLOSED (Downward) position.

- Input Signal Setting for fully-OPEN (Upward) position:
  - Press MODE-PB until [I][_][o] appears, then press SET-PB to enter the setting sub-menu.
  - Press DOWN-PB until [F][U][l] appears, then hold the SET-PB until [F][U][l] is flashing.
  - Supply the input signal according to the setting on the DIP switch. 20mA or 10V.
  - Press SET-PB once and MODE-PB twice to complete the input signal setting for the fully-OPEN (Upward) position.

- Output Signal Setting for fully-OPEN (Upward) position:
  - Attach an ammeter or voltmeter to the output signal connection. (terminals 11 and 12)
  - Press MODE-PB until [I][_][o] appears, then press SET-PB to enter setting sub-menu.
  - Adjust with UP-PB and DOWN-PB until [F][F][o] appears.
  - Hold the SET-PB down for about 3 seconds.
  - Adjust the output value with UP-PB and DOWN-PB until the value is correct.
  - Press SET-PB once and MODE-PB twice to complete the output signal setting for the fully-OPEN (Upward) position.

Control Board Alarm Message Screen

The following procedure allows the user to access the Alarm Message Screen to view any messages in order to troubleshoot any issues that may arise.

- Press the MODE-PB once until  appears, then press SET-PB once to get into the Alarm Message Screen.

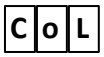
- Adjust with the UP-PB and DOWN-PB to review the history log.
- Each line is numbered from 9 to 0, with 9 being the latest Alarm Message data occurrence and 0 being the oldest.
- When entering this menu, Line item 9 will appear first. To view older items in the history log, press DOWN-PB to scroll through the menu.

Line Item Number	Alarm Message	Remedies
9	 (Wrong Input Signal)	Check if the input signal and DIP switch settings are correct. Input signal fault.
8	 (Abnormal Handwheel)	Check if the handwheel is pulled out completely.
7	 (No Alarm)	

Troubleshooting

Problem	Remedies
Motor does not operate and overheats.	There may be a valve issue. Inspect/replace the valve.
	Check for any obstructions in the flowline.
	Motor shaft or bearing may be broken. Replace parts.
	The handwheel may be partially engaged, pull out completely.
The actuator operates, but the motor is hot.	The actuator may be operating too frequently. Check if operation is within duty rating of the actuator.
	Overload issue. Runtime may be longer than specified. New valve may be required.
	The voltage may be under-/over-rated. Check the supply voltage.
The valve does not move when given a signal or in manual operation.	Check installation between the actuator and valve, as it may not be assembled properly.
	The thrust requirement of the valve may be larger than the thrust of the actuator. Check sizing to confirm correct actuator selection for the valve.
The PCB Board is not responding.	It's possible that a fuse is blown or that the board is damaged. It must be replaced.

3-Digit Display Menu Codes

Parameter display	Description
	Alarms
	Basic Parameter
	Local Control Mode
	Quick settings
	To enable Auto Set for Fully-Open and Fully-Closed.
	To enable the travel stops instead of the force trip stops for Fully-Closed
	To enable the travel stops instead of the force trip stops for Fully-Open
	To set the travel of variable resistor as well as indicate the preset value. (It should not be changed.)
	To set the deviation value of the input signal
	To set input signal for Fully-Closed
	To set input signal for Fully-Open
	To set output signal for Fully-Closed
	To set output signal for Fully-Open
	To set the Baud rate when Modbus is optioned.
	To set Station ID when Modbus is optioned
	Displaying position