SEA Electric Actuator IOM

REVISION: 4
DATE: 7-2025

INSTALLATION, OPERATIONS AND MAINTENANCE FOR SHARPE® SEA ¼ TURN ELECTRIC ACTUATORS

OVERVIEW

Sharpe® brand electric quarter-turn actuators offer a wide range of torque output models. The product design is based on a self-locking worm drive principle, which provides for a smooth running, dependable, robust drive system. All models are ISO 5211 compliant and most have a visual position indicator on top of actuator cover and manual override

LUBRICATION

The gearbox of the Sharpe® brand actuator is enclosed, and it has already been lubricated sufficiently with high temperature lubricant at the factory and should not require any attention unless it has leaked out.

IMPORTANT NOTICES & MAINTENANCE

➢ Notices:

- Make sure the voltage is correct before wiring.
- Turn off power before performing any maintenance.
- Seal the casing and conduit entrance after wiring to prevent dust or water contamination.
  - It is also recommended to seal the end of the conduit, after the wires are run thought it, to help prevent condensation forming under the cap.
- The angle of installation must be between 0~180°. Do not install upside down or below the horizontal.
- Do not install when hazardous or explosive gases may be present.
- The frequency of open and close is restricted based on duty cycle. Avoid too high frequency.

Duty Cycle – compliance to IEC standard

"Duty cycle" means the starting frequency.
The formula: Running Time ÷ (Running time + Rest Time) × 100% = duty cycle
Rest Time = Running Time × (1- duty cycle) ÷ duty cycle

For example : SEA 8
30% duty cycle 17 × [(1 – 30%) / 30%] = 40 → The rest time will be 40 sec.
75% duty cycle 19 × [(1 – 75%) / 75%] = 6 → The rest time will be 6 sec.

If the duty cycle is higher, the rest time will be shortened. It means the starting frequency will be higher.

- When more than one electric actuator needs to operate simultaneously, please connect individually.
- Always connect the ground wire to the inside of the electric actuator.
- Not intended for vacuum spaces and avoid installing near explosive atmospheres.
- To avoid functional failure caused by statics, do not touch any components on the PCB with metal tools or bare hands.

➢ Storage:

- The actuator should be placed in a clean and dry place and protected from the weather and extreme vibration.
- If actuator needs to be stored outside, it must be protected from excess moisture, dust, and weather.

INSTALLATION

1. Before mounting the actuator, verify that the valve torque requirement is less than the output torque of the actuator. (The suggested safety factor is 30% of the max. torque of the valve.) Refer to EB-2001 for the published valve torque data and the specification portion of this document for the actuator torques.
   - **For example :**
     If the maximum valve torque is 700 in/lbs : 700 × 1.3(safety factor) = 910 in/lbs.
     910 in/lbs. < 1330 in/lbs.= SEA 13 is **OK**!
     910 in/lbs. > 800 in/lbs. = SEA 8 is **not OK!**
2. Check that the stem of the valve fits the actuator and the mounting holes match before inserting into the actuator. Please use a mounting plate, insert, or adapter to connect if they do not match.
3. Verify that the actuator position, open or closed, matches with the position of the valve prior to mounting. Use the manual override to change position if necessary.
4. Remove valve's handle if needed and mount the actuator.

   ⚠ **CAUTION: Don't remove any necessary parts for the proper operation of the valve. Always confirm with the valve manufacturer before removing any additional parts.**
5. Verify again that the valve and actuator are in the same orientation, either opened or closed.
6. Attach the actuator to the valve directly or with a mounting kit, then tighten all mounting fasteners.
7. Remove actuator cover.

   ⚠ **CAUTION: Always be sure the power is off at the main power box.**
8. Wire the actuator using the wiring diagram inside of the cover.

   ⚠ **CAUTION: For the 3-Phase on-off controller actuator, please use the handwheel to turn the actuator to 45° before any testing. If the operating direction is opposite after supplying power, the wiring will need to be checked again.**
9. Verify the wiring is correct. It is recommended that a single actuator get its own individual power loop. If the system requires that multiple actuators be connected in parallel an isolating relay module is required or the actuators can overheat.
10. Supply power to the actuator.

    ⚠ **CAUTION: Use a warning label to indicate there are live circuits that could cause electrical shock or death.**
11. Make sure, if it is needed, to calibrate the fully-open or fully-closed position of the actuator. It should be properly set already from the supplier.
12. If the actuator is a modulating type, make sure to set the required settings as noted in this document.

    ⚠ **CAUTION: Always turn power off before changing any setting.**
13. Replace cover and secure cover screws.

SPECIFICATIONS

➢ 12V DC/AC / 24V DC/AC

Model	Power (watts)	Max Torque (In/lb)	Speed (Sec/90°)			Current * (Amps)		
			12 V DC/AC DC / 60 / 50 Hz	24 V DC/AC DC / 60/ 50 Hz		12 V DC/AC DC / 60 / 50 Hz	24 V DC/AC DC / 60 / 50 Hz	
			On & Off	On & Off	PP	On & Off Running	On & Off Running	PP Running
SEA 1	5W	132	18 / - / -	16 / 19 / 23	N/A	0.6 / - / -	0.4 / 0.6 / 0.7	
SEA 3	10W	310	22 / 22 / 21	18 / 18 / 18	18 / 18 / 18	2.1 / 2.4 / 2.3	1.4 / 1.6 / 1.6	1.3 / 2.8 / 2.8
SEA 4	10W	445		36 / 37 / 37	36 / 37 / 37		1.4 / 1.6 / 1.6	1.3 / 2.8 / 2.8
SEA 8	40W	800		18 / 18 / 17	18 / 18 / 17		2.8 / 3.4 / 3.4	2.8 / 3.4 / 3.4
SEA 13	40W	1330		27 / 26 / 26	27 / 26 / 26		2.6 / 3.1 / 3.1	2.6 / 3.1 / 3.1
SEA 35	80W	3540		21 / 20 / 20	21 / 20 / 20		7.7 / 9.4 / 9.4	7.7 / 9.4 / 9.4
SEA 44	80W	4430		28 / 26 / 26	28 / 26 / 26		7.4 / 8.9 / 9.0	7.4 / 8.9 / 9.0
SEA 57	80W	5755	35 / - / -	37 / 37 / 39	37 / 37 / 39	12.3 / - / -	9.0 / 11.1 / 11.6	9.0 / 11.1 / 11.6
SEA 88	120W	8855	31 / - / -	52 / 44 / 47	52 / 44 / 47	21.7 / - / -	6.1 / 8.2 / 8.1	6.1 / 8.2 / 8.1
SEA 132	120W	13280	36 / - / -	58 / 55 / 58	58 / 55 / 58	25.6 / - / -	9.0 / 11.1 / 11.6	9.0 / 11.1 / 11.6
SEA 177	180W	17710	56 / - / -	77 / 66 / 71	77 / 66 / 71	26.1 / - / -	9.0 / 12.3 / 11.8	9.0 / 12.3 / 11.8
SEA 221	180W	22140	58 / - / -	84 / 76 / 86	84 / 76 / 86	31.5 / - / -	11.5 / 14.6 / 14.6	11.5 / 14.6 / 14.6
SEA 265	180W	26565		66 / 68 / 65	66 / 68 / 65		14.9 / 16.8 / 17.2	14.9 / 16.8 / 17.2
SEA 310	220W	31000		67 / 70 / 68	67 / 70 / 68		16.7 / 19.0 / 19.1	16.7 / 19.0 / 19.1
For other options not listed please contact Sharpe®								

* The values listed are for the standard running amps of the motor. Start up and lock up amperage is application/load specific and can be higher. It is up to the end user to determine the appropriate system amperage needed in their specific application.

➢ 120 VAC / 220 VAC

Model	Power (watts)	Max Torque (In/lb)	Speed (Sec/90°)					Current * (Amps)				
			120 VAC 60 / 50 Hz		220 VAC (1PH) 60 / 50 Hz		220 VAC (3PH) 60 / 50 Hz	120 VAC 60 / 50 Hz		220 VAC (1PH) 60 / 50 Hz		220 VAC (3PH) 60 / 50 Hz
			On & Off	PP	On & Off	PP	On & Off	On & Off Running	PP Running	On & Off Running	PP Running	On & Off Running
SEA 1	5W	132	19 / 23	N/A	19 / 23			0.3 / 0.3		0.2 / 0.2		
SEA 3	10W	310	12 / 17	18 / 17	15 / 17	18 / 18		0.7 / 0.8	0.6 / 0.6	0.4 / 0.4	0.4 / 0.4	
SEA 4	10W	445	27 / 37	33 / 33	25 / 33	30 / 30		0.7 / 0.8	0.6 / 0.6	0.4 / 0.4	0.4 / 0.4	
SEA 8	40W	800	17 / 20	19 / 19	17 / 21	16 / 16	16 / 19	1.2 / 1.7	0.8 / 0.8	0.6 / 0.8	0.4 / 0.4	0.5 / 0.6
SEA 13	40W	1330	26 / 31	29 / 28	26 / 31	26 / 25	26 / 31	1.2 / 1.7	0.7 / 0.7	0.6 / 0.8	0.4 / 0.4	0.5 / 0.6
SEA 35	80W	3540	19 / 23	24 / 23	20 / 23	22 / 22	21 / 24	2.1 / 2.4	2.1 / 2.2	1.1 / 1.3	1.1 / 1.1	0.9 / 1.0
SEA 44	80W	4430	26 / 31	28 / 28	26 / 31	28 / 28	27 / 31	2.0 / 2.4	1.9 / 1.9	1.0 / 1.3	1.0 / 1.1	0.9 / 1.0
SEA 57	80W	5755	34 / 41	38 / 38	34 / 40	35 / 35	34 / 40	2.4 / 2.5	2.0 / 2.1	1.1 / 1.3	1.0 / 1.1	0.9 / 1.0
SEA 88	120W	8855	50 / 61	59 / 58	50 / 61	59 / 58	52 / 61	4.2 / 6.6	2.0 / 2.0	2.0 / 3.3	1.2 / 1.2	1.2 / 1.6
SEA 132	120W	13280	51 / 62	79 / 82	51 / 62	79 / 82	54 / 63	4.2 / 6.6	2.8 / 2.8	2.0 / 3.3	1.6 / 1.6	1.2 / 1.6
SEA 177	180W	17710	62 / 76	65 / 75	62 / 76	72 / 70	64 / 75	3.0 / 3.1	2.7 / 2.9	2.5 / 1.8	1.1 / 1.2	1.1 / 1.4
SEA 221	180W	22140	62 / 76	76 / 83	62 / 76	85 / 95	64 / 75	3.2 / 3.2	3.0 / 3.3	2.6 / 1.9	1.4 / 1.4	1.2 / 1.4
SEA 265	180W	26565	62 / 76	71 / 75	62 / 76	61 / 61	64 / 75	3.6 / 3.3	4.3 / 4.4	2.7 / 2.0	2.2 / 2.4	1.2 / 1.4
SEA 310	220W	31000	62 / 76	76 / 77	62 / 76	65 / 67	64 / 75	3.8 / 3.9	4.5 / 4.8	2.5 / 2.0	2.5 / 2.6	1.3 / 1.5
For other options not listed please contact Sharpe®												

* The values listed are for the standard running amps of the motor. Start up and lock up amperage is application/load specific and can be higher. It is up to the end user to determine the appropriate system amperage needed in their specific application.

TRAVEL CAM & LIMIT SWITCHES ADJUSTMENT

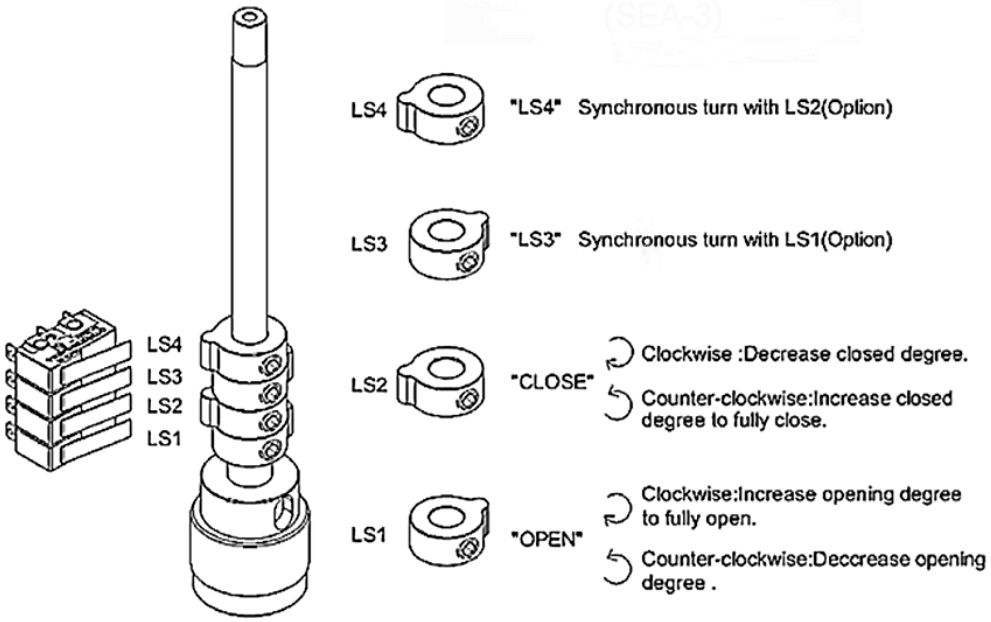
- The travel cams are set to control the open and closed position of the valve. LS1 & LS2 limit the maximum range by disabling the electric motor.

- LS3 & LS4 are optional. They allow external equipment to confirm that the valve has reached the fully open and fully closed positions.

    - IMPORTANT: If LS3 & LS4 are fitted, they should be set to trip slightly prior to LS1 & LS2 to avoid over-travel.

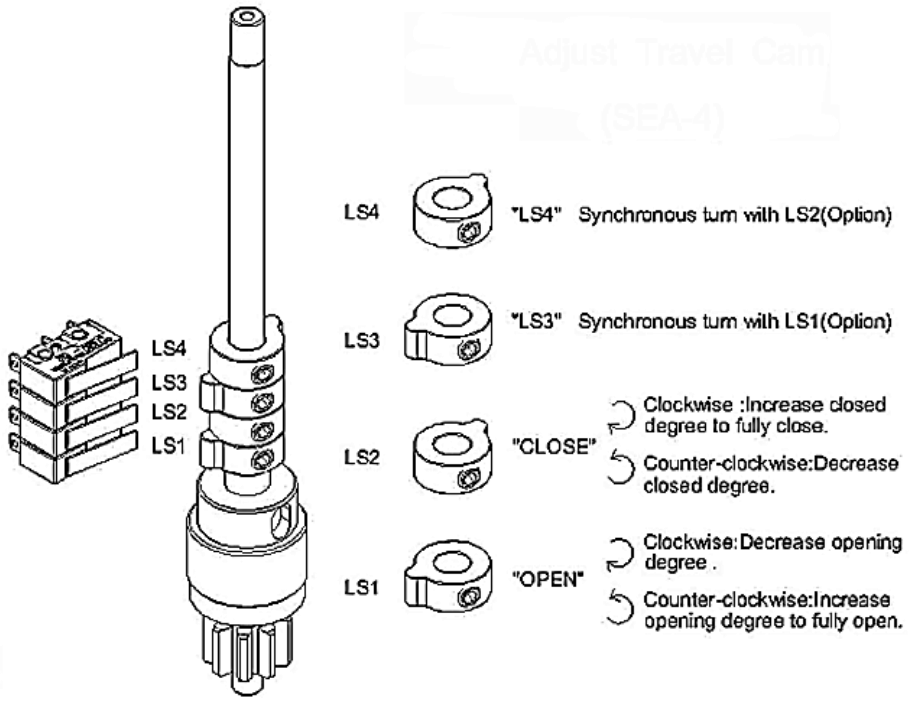
- A 2.5mm hex key will be required to adjust cam settings.

➢ Travel Cam Adjustment –SEA 3

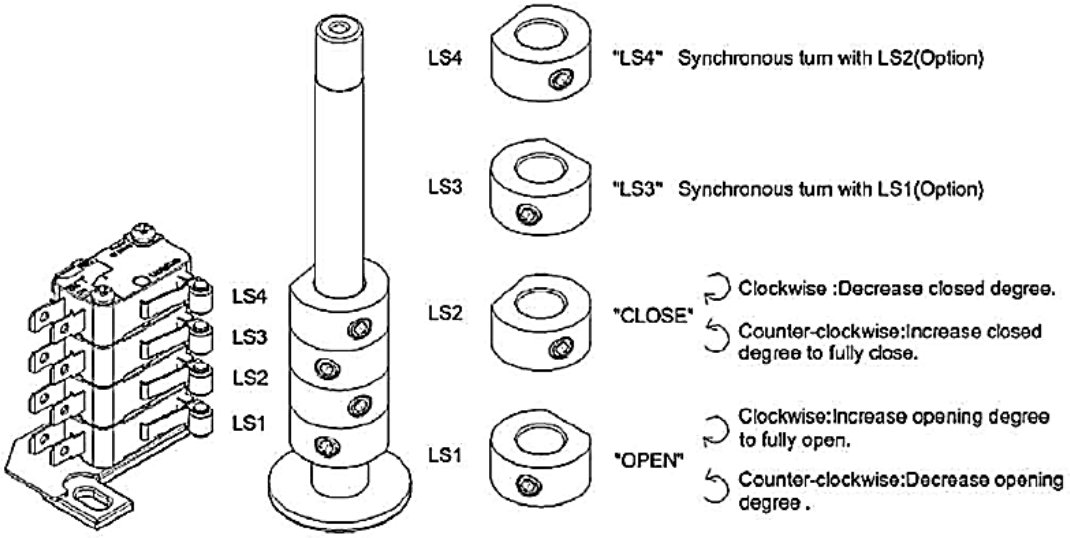


TRAVEL CAM & LIMIT SWITCHES ADJUSTMENT (cont.)

- Travel Cam Adjustment –SEA 4

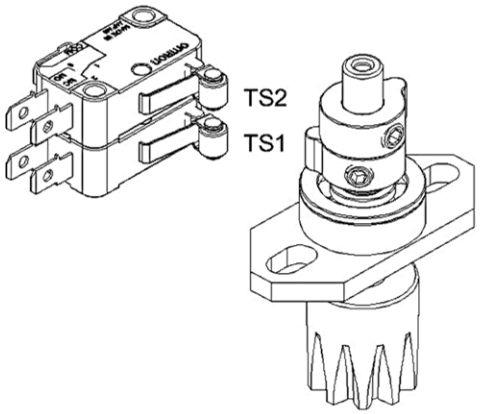


- Travel Cam Adjustment –SEA 8 - SEA310



TRAVEL CAM & TORQUE SWITCHES ADJUSTMENT

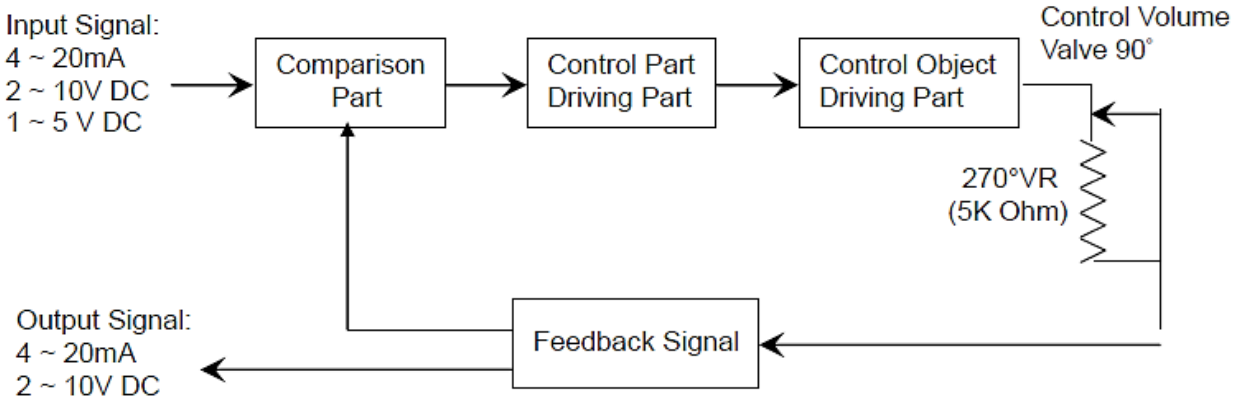
➢ Travel Cam Adjustment –SEA 8 - SEA310



TS2 "CLOSE"
- Counter-clockwise:Decrease the degree of torque setting.
- Clockwise :Increase the degree of torque setting.

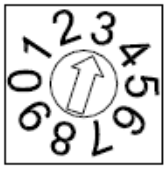
TS1 "OPEN"
- Counter-clockwise:Decrease the degree of torque setting.
- Clockwise :Increase the degree of torque setting.

MODULATING CONTROL BOARD PROCEDURE



Supplied Voltage : 24V DC / AC, 110V / 220V AC 1- Phase

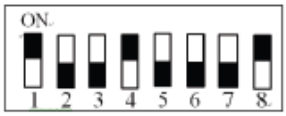
SENSITIVITY SWITCH



- Setting
  - When switch is set to “1”:
    - This is the highest sensitivity and the 0~90 degree can be divided up to around 50 times movement.
  - When switch is set to “0”:
    - This is the lowest sensitivity and the 0~90 degree can be divided up to around 10 times movement.
  - The sensitivity decreases 5 times movement by sectors from SW1 to SW2, SW2 to SW3, SW3 to SW4 and so on.

DIP SWITCH SETTING

IMPORTANT: DO NOT ALTER SWITCH POSITIONS WHILE ACTUATOR HAS POWER



	1	2	3	4	5	6	7	8
Factory Setting	ON	OFF	OFF	ON	OFF	OFF	OFF	ON
4 - 20 mA input	ON	OFF						
1 - 5 V input	OFF	OFF						
2 - 10 V input	OFF	ON						
4 - 20 mA output			OFF	ON	OFF			
2 - 10 V output			ON	OFF	ON			
Closed direction setting: CW						OFF		
Closed direction setting: CCW						ON		
When signal input failed, driving valve to fully-open							ON	OFF
When signal input failed, driving valve to fully-closed							OFF	ON
When signal input failed, valve stays at the last position							ON	ON
							OFF	OFF

DIP SWITCH SETTING (cont.)

- **S1 & S2:**
  - INPUT SIGNAL SELECT
    - 4~20m/A set 1-ON / 2-OFF
    - 1~5V set 1-OFF / 2-OFF
    - 2~10V set 1-OFF / 2-ON
- **S3 & S4 & S5:**
  - OUTPUT SIGNAL SELECT
    - 4-20m/A set 3-OFF / 4-ON / 5-OFF
    - 2-10V set 3-ON / 4-OFF / 5-ON
- **Position Select:**
  - S6 ON
    - 4mA, 2V, 1V = valve fully-open.
    - 20mA, 10V, 5V = valve fully-closed.

    ❖ S7 & S8 – Position Select when input signal fails
    - Valve fully-closed set 7-ON / 8-OFF.
    - Valve fully-open set 7-OFF / 8-ON.
    - Valve stops set 7-ON / 8-ON or 7-OFF/ 8-OFF.

  - S6 OFF
    - 4mA, 2V, 1V = valve fully-closed.
    - 20mA, 10V, 5V = valve fully-open.

    ❖ S7 & S8 – Position Select when input signal fails
    - Valve fully-closed set 7-OFF / 8-ON.
    - Valve fully-open set 7-ON / 8-OFF.
    - Valve stops set 7-ON / 8-ON or 7-OFF/ 8-OFF.

    Even if S6 is adjusted, the feedback signal will not change.

OPEN AND CLOSE SETTING
(SEA 3 & SEA 4)

The settings are set at factory, though in some cases a re-set may be required when a particular rate of signal is requested.

➢ Settings for OPEN and CLOSE

- o The function of VR
  - ▪ Adjust output signal/input signal
    - VR1— Adjust 10V, 20mA (Input signal: fully-open)
    - VR51— Adjust 10V, 20mA (Output signal: fully-open)
    - VR2 — Adjust 2V, 4mA (Input signal: fully-closed)
    - VR52 — Adjust 2V, 4mA (Output signal: fully-closed)

Note: If it is necessary to adjust VR51 and VR52, VR1 and VR2 also need to be adjusted accordingly.

- o Rotate VR1 counterclockwise until a light click is heard, then supply 10V (or 20mA) to modulating board. Slightly rotate VR1 clockwise until green LED keeps on. Adjust VR51 to complete.
  - ▪ VR51:
    - ↻ Clockwise: decreasing signal
    - ↺ Counterclockwise: increasing signal

- o Rotate VR2 clockwise until a light click is heard, then supply 2V (or 4mA) to modulating board. Slightly rotate VR2 counterclockwise until red LED keeps on. Adjust VR51 to complete.
  - ▪ VR52:
    - ↻ Clockwise: decreasing signal
    - ↺ Counterclockwise: increasing signal

OPEN AND CLOSE SETTING
(SEA 8 & SEA 310)

The settings are set at factory, though in some cases re-set may be required when a particular rate of signal is requested

- Open Setting
  - Keep pressing “SET” for 2 seconds, then LD 9 comes on, it will enter to the manual mode.
  - Keep pressing “UP” until actuator runs to fully-open position, LD2 comes on, then supplies the input signal (5V or 10V or 20mA).
  - Press “MODE” once. The OPEN setting is completed.

- Close Setting
  - Keep pressing “DOWN”, until actuator runs to fully-closed position, LD1 comes on, then supplies input signal (1V or 2V or 4mA).
  - Press “MODE” once. The CLOSE setting is completed.

After completing the above settings, press “SET” once

- Adjust Output Signal
  - VR2:
    - ↻ Clockwise: decreasing signal
    - ↺ Counterclockwise: increasing signal

MECHANICAL STOPS

Mechanical stops should only be reached during manual operation. Failure to ensure the electrical limit switches are reached before the mechanical stops are hit, when operating in electric mode, can cause personal injury or damage to the actuator.

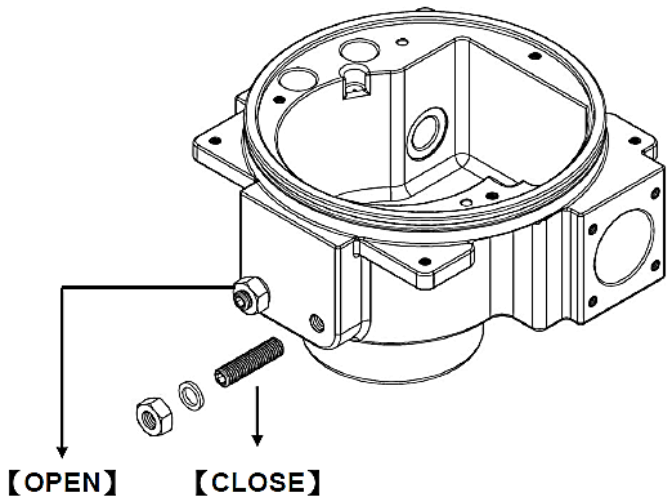
They are factory set, though may require adjustment once the actuator is mounted to a valve.

- For Electric Operation:
  - Please refer to Travel Cam & Limit Switches Adjustment section of this document.

MECHANICAL STOPS (cont.)

- For Manual Operation:
  - Set the open stop.
    - Remove power from actuator.
    - Loosen locknut on the open stop stud (left side) and unscrew it a few turns.
    - Unscrew the stop stud.
    - Manually turn the actuator to the desire limit position.
    - Screw in the stop stud until it contacts the internal cam, then reverse one rotation.
    - Tighten the locknut.
    - Check that the electrical limit switches can still be reached.
  - Set the close stop.
    - Remove power from actuator.
    - Loosen locknut on the close stop stud (right side) and unscrew it a few turns.
    - Unscrew the stop stud.
    - Manually turn the actuator to the desire limit position.
    - Screw in the stop stud until it contacts the internal cam, then reverse one rotation.
    - Tighten the locknut.
    - Check that the electrical limit switches can still be reached.

Failure to ensure the electrical limit switches are reached before the mechanical stops are hit, when operating in electric mode, can cause personal injury or damage to the actuator.

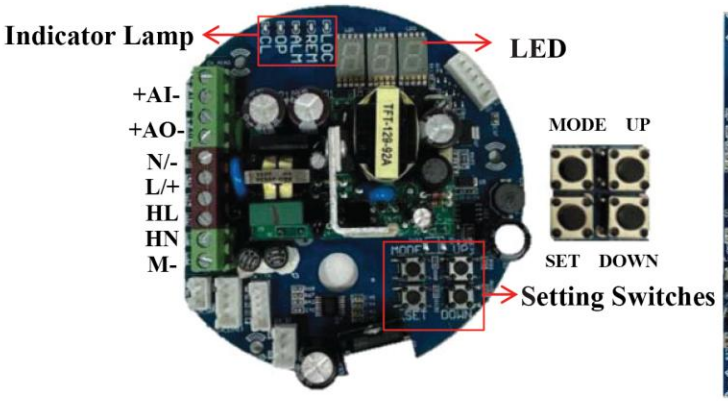


New Modulating Control Board
Modulating Control Board Adjustment

SEA-3-4-PP/ SEA-4-PP Modulating Control Board and Modbus Board (Optional)

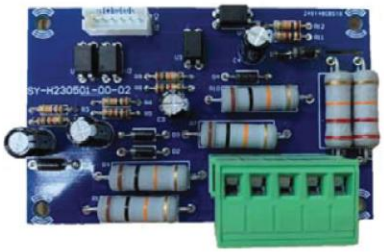
Surface Instruction

- **If the LED display is not operated for ten minutes, it will go out and return to the first level [9 9]. Please press any button to display it again. In local control mode, the LED display will return to remote control mode after it goes out.**
- **The layout is based on 110 / 220 V AC.**
- **Modulating board, Modbus board, and digital input board (DI) can be installed simultaneously, but only one can be used for control.**



Modulating Control

Modbus Board (Optional)



Digital Input Board (Optional)

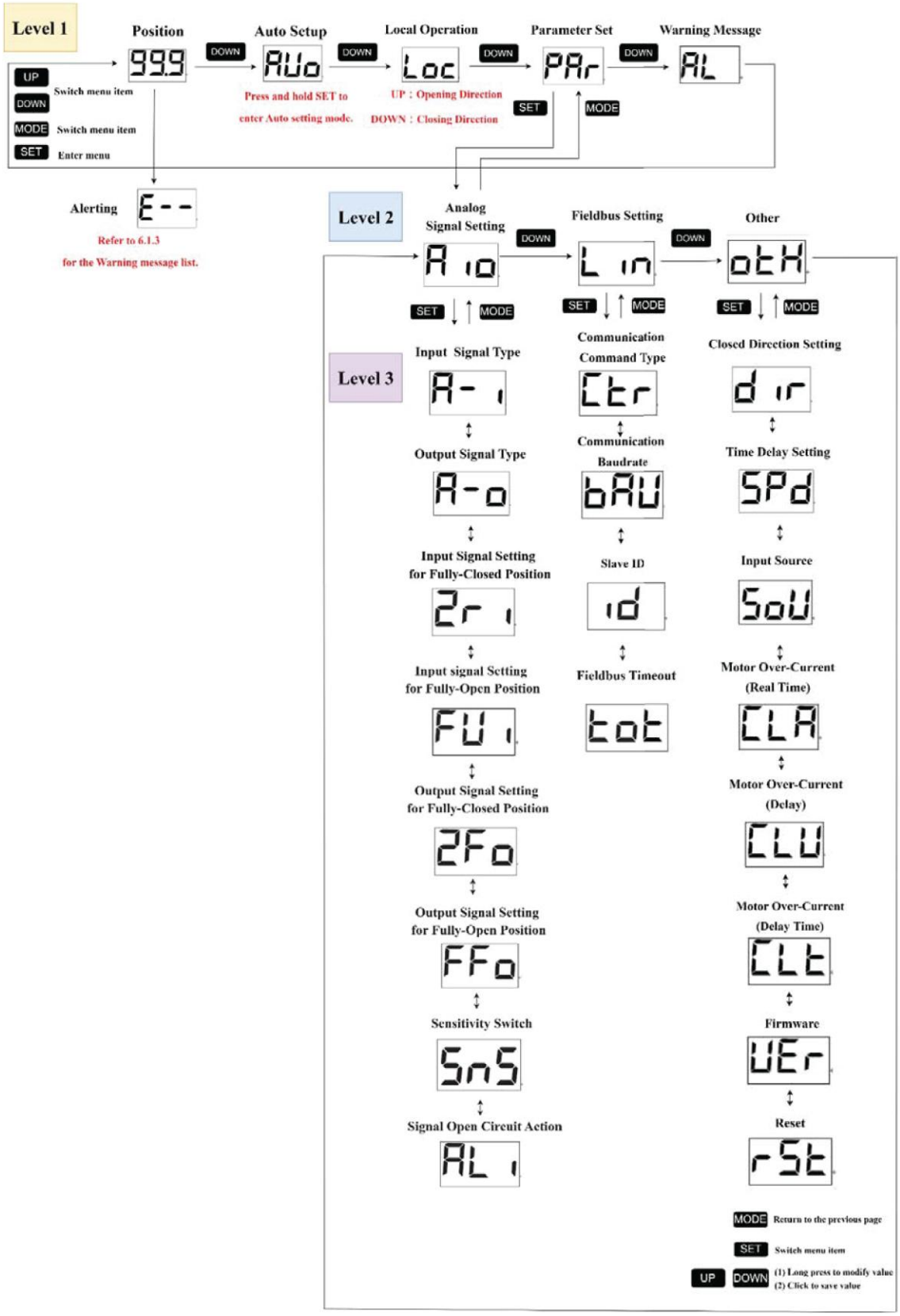
- **Lamp Status**

Lamp Code		Actuator Status
CL		Light on: Fully-Closed Flashing: Closing Direction
OP		Light on: Fully-Open Flashing: Opening Direction
ALM		Alerting Signal
REM		Remote Control Mode
LOC		Local Control Mode

- **Analog Signal Connection Terminal Blocks**

Terminal	Status
AO -	Analog signal output (-)
AO +	Analog signal output (+)
	N/A
AI -	Analog signal input (-)
AI +	Analog signal input (+)

Settings Menu



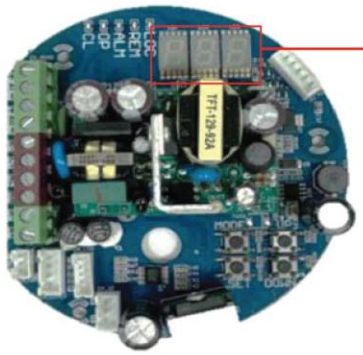
Position Percentage

➢ Standby

⚠ **When an error occurs, the error code and the actuator's final position percentage will flash alternately (Refer to below warning message list).**

- Range: 000 to 100
  - ➢ 0 % = 00.0, 100 % = 100

    Example: 99.9% is displayed as 99.9.
- The LED display will show the current position of the actuator.



- **Warning message list**

Error Code	Warning Message
E17	Limit Switch Fault
E19	Digital Input Fault
E21	Input Signal Fault
E22	Output Signal Fault
E23	Flash Memory and Operating Status Fault
E25	MODBUS Timeout
E27	Low Input Voltage
E30	Installation Error of Potentiometer
E31	Positioning Fault
E32	OPEN Potentiometer Fault
E33	CLOSE Potentiometer Fault
E34	Abnormal Current for Open Direction
E35	Abnormal Current for Closed Direction
E38	Signal Open Circuit

Auto Setup AUo

⚠ **Be sure to reset OPEN and CLOSE position according to the following steps after recalibrating fully-open and fully-closed position.**

- Auto setup for the fully-open and fully-closed positions.
- Setting Steps:
  a. Press "DOWN" several times to get into AUo .
  b. Press and hold "SET" around 3 sec to enter Auto Setup mode, Steps c to e will be executed automatically.
  c. Auto run the actuator in CCW direction until the display shows 100% to reach the fully-open position.
  d. Auto run the actuator in CW direction until the display shows 0% to reach the fully-closed position.
  e. The setting is completed.
  a. After completing the AUo setup, refer to input setup.
  mode SoU as required.
    - ➢ Refer to Pg. 17 - 24 for modulating mode.
    - ➢ Refer to Pg. 25 - 27 for Modbus mode.
    - ➢ No basic parameter settings are required for digital input mode.

Local Control LoC

- The actuator could be directly controlled in the field.
- Setting Range: 0% to 100%.
- Setting Steps:
  a. Press "DOWN" several times to get into LoC .
  b. Press "SET" until LoC displays on to enter local control mode. The display will show the current position and the LoC lamp will light on.
  c. Press "UP" and "DOWN" buttons to perform open and close settings. Press "UP" to run the actuator toward opening direction and press "DOWN" to run the actuator toward closing direction.
  d. Press "MODE" to complete the local operationand return to the previous menu.

Parameter Setting PAr

- Set the input mode SoU first (Pg. 16), then configure the signals and other parameters according to the selected input mode. If the input mode is changed, adjust the wiring according to the corresponding wiring diagram.

Analog Signal Setting (Modulating Control) A 10

⚠ **Use a multimeter to measure the output signal in accordance with the selected signal type.**

⚠ **Be sure to complete the analog input /output signal type setting before setting the fully-closed / fully-open input / output signal.**

a. Analog Input Type A- 1

- Analog input signal type setting.
- Default Setting: 000
- Setting Steps:
  1. Press "DOWN" several times until PAr displays, then press "SET" once to enter parameter setting.
  2. Press "UP" or "DOWN" until A 10 displays, then press "SET" once to enter analog signal setting.
  3. Press "UP" or "DOWN" until A- 1 displays, then press "SET" once to enter analog input signal type setting.
  4. Press and hold "SET" around 3 sec until the indicator shows the parameter code and flashes.
  5. Press "UP" or "DOWN" to select desired parameter code according to the following table.

Parameter Code	Input Signal Type
000	4 - 20 mA
001	0 - 20 mA
002	1 - 5 V
003	0 - 5 V
004	2 - 10 V
005	0 - 10 V

6. Once selected, press "SET" once to complete analog input signal type setting.

b. Output Signal Type A-o

- Output signal type setting.
- Default Setting: 000
- Setting Steps:
  1. Press "DOWN" several times until PAr displays, then press "SET" once to enter parameter setting.
  2. Press "UP" or "DOWN" until A io displays, then press "SET" once to enter analog signal setting.
  3. Press "UP" or "DOWN" until A-o displays, then press "SET" once to enter output signal type setting.
  4. Press and hold "SET" around 3 sec until the display shows the parameter code and flashes.
  5. Press "UP" or "DOWN" to select desired parameter code according to the following table.

Parameter Code	Output Signal Type
000	4 - 20 mA
001	0 - 20 mA
002	1 - 5 V
003	0 - 5 V
004	2 - 10 V
005	0 - 10 V

  6. Once selected, press "SET" once to complete output signal type setting.

c. Input signal setting for fully-closed position 2r 1

- Set the input signal value for fully-closed position.
- Setting Range: 000 to 4095.
  - ➢ The LED display is designed with hexadecimal format, so the value of 4095 is dislayed as FFF.
- Setting Steps:
  1. Press "DOWN" several times until PAr displays, then press "SET" once to enter parameter setting.
  2. Press "UP" or "DOWN" until A 10 displays, then press "SET" once to enter analog signal setting.
  3. Press "UP" or "DOWN" until 2r 1 displays, then press "SET" once to enter input signal setting for fully-closed position.
  4. Press and hold "SET" around 3 sec until the display shows the value and flashes.
  5. Use a signal generator to output Input a signal of 4 mA, 1 V, or 2 V based on the setting of A- 1, then press "SET" once to complete the input signal setting of fully-closed position.

⚠ **When the signal type of 0 - 20 mA, 0 - 5 V, or 0 - 10 V is selected, input the calibration signal value of 4 mA, 1 V, or 2 V to perform the setup.**

Signal Type	Calibration Signal Value
4 - 20 mA	4 mA
0 - 20 mA	
1 - 5 V	1 V
0 - 5 V	
2 - 10 V	2 V
0 - 10 V	

d. Input signal setting for fully-open position FU 1

- Set the input signal value for fully-open position.
- Setting Range:000 to 4095。
  - ➢ The LED indicator is displayed in hexadecimal format, so the value of 4095 is displayed as FFF.
- Setting Steps:
  1. Press "DOWN" several times until PAr displays, then press "SET" once to enter parameter setting.
  2. Press "UP" or "DOWN" until A 10 displays, then press "SET" once to enter analog signal setting.
  3. Press "UP" or "DOWN" until FU 1 displays, then press "SET" to enter input signal setting for fully-open mode.
  4. Press and hold "SET" around 3 sec until the indicator shows the value and flashes.
  5. Use a signal generator to output 20 mA, 5 V, or 10 V based on the setting of A- 1, then press "SET" once to complete the input signal setting of fully-open position.

⚠ **When the signal type of 0 - 20 mA, 0 - 5 V, or 0 - 10 V is selected, input the calibration signal value of 20 mA, 5 V, or 10 V to perform the setup.**

Signal Type	Calibration Signal Value
4 - 20 mA	20 mA
0 - 20 mA	
1 - 5 V	5 V
0 - 5 V	
2 - 10 V	10 V
0 - 10 V	

e. Output signal setting for fully-closed Position 2Fo

- Set the output signal value for fully-closed position.
- Setting Range: 000 to 4095.
  - ➢ The LED display is designed with hexadecimal format, so the value of 4095 is displayed as FFF.
- Setting Steps:
  1. Press "DOWN" several times until PAr displays, press "SET" once to enter parameter setting.
  2. Press "UP" or "DOWN" until A io displays, then press "SET" once to enter analog signal setting.
  3. Press "UP or "DOWN" until 2Fo displays, then press "SET" once to enter output signal setting for fully-closed mode.
  4. Press and hold "SET" around 3 sec until the display shows the value and flashes.
  5. Press "UP" or "DOWN" to adjust the value until the signal meter receives the value of 4 mA, 1 V or 2 V according to the output signal type of A-o setting. Then press "SET" once to complete the output signal setting for fully-closed position.

⚠ **When the signal type of 0 - 20 mA, 0 - 5 V, or 0 - 10 V is selected, input the calibration signal value of 4 mA, 1 V, or 2 V to perform the setup.**

Signal Type	Calibration Signal Value
4 - 20 mA	4 mA
0 - 20 mA	
1 - 5 V	1 V
0 - 5 V	
2 - 10 V	2 V
0 - 10 V	

f. Output signal setting for fully-open Position FFo

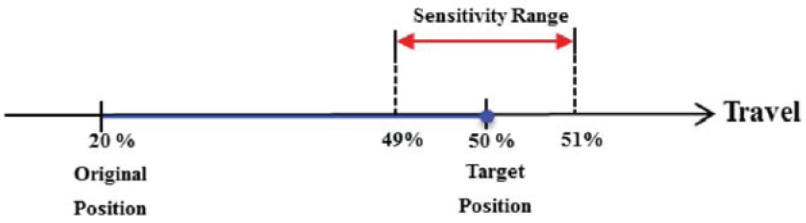
- Set the output signal value for fully- open position.
- Setting Range:000 to 4095.
  - ➢ The LED display is designed with hexadecimal format, so the value of 4095 is dislayed as FFF.
- Setting Steps:
  1. Press "DOWN" several times until PAr displays, press "SET" once to enter parameter setting.
  2. Press "UP" or "DOWN" until A io displays, then press "SET" once to enter analog signal setting.
  3. Press "UP or "DOWN" until FFo displays, then press "SET" enter output signal setting for fully-open mode.
  4. Press and hold "SET" around 3 sec, until the display shows the value and flashes.
  5. Press "UP" or "DOWN" to adjust the value until the signal meter receives the value of 20 mA, 5 V or 10 V according to the output signal type of A-o setting. Then press "SET" once to complete the output signal setting for fully-open position.

⚠ **When the signal type of 0 - 20 mA, 0 - 5 V, or 0 - 10 V is selected, input the calibration signal value of 20 mA, 5 V, or 10 V to perform the setup.**

Signal Type	Calibration Signal Value
4 - 20 mA	20 mA
0 - 20 mA	
1 - 5 V	5 V
0 - 5 V	
2 - 10 V	10 V
0 - 10 V	

g. Sensitivity Setting SnS

- When the value of sensitivity (%) is lower, the resolution of the input signal will be higher, and relatively the dead band will be smaller. Excessive high resolution may cause the actuator to keep hunting and could not run to the desired position which will lead to the thermostat inside the motor to trip because of overheating, and finally the actuator will shut down. If this situation happens, it is suggested to adjust the sensitivity setting.
- Setting Range: 0.1 % to 5.0 %.
  - ➢ When set to 0.1 %, it means that the allowable tolerance is ± 0.1 %, which is the highest sensitivity.
  - ➢ When set to 5.0 %, it means that the allowable tolerance is ± 5 %, which is the lowest sensitivity.
  - ➢ For example, if the sensitivity switch is set to 1% and the target position is 50 %, the valid sensitivity range will be from 49 % to 51 % as shown in the figure below.



- Default Setting:
  - ➢ SEA-3-4-PP/ SEA-4-PP：0.7 %
- Setting Steps:
  1. Press "DOWN" several times until PAr displays, then press "SET" once to enter parameter setting.
  2. Press "UP" or "DOWN" until A io displays, then press "SET" once to enter analog signal setting.
  3. Press "UP" or "DOWN" until SnS displays, then press "SET" once to enter sensitivity setting.
  4. Press and hold "SET" around 3 sec until the display shows the value and flashes.
  5. Press "UP" or "DOWN" to adjust the sensitivity switch setting.
  6. Press "SET" to complete the sensitivity switch setting.

h. Signal Open Circuit Action AL

- Action mode when the input signal fails or communication protocol timeout.

  ⚠ **The function only available for the A- set at 4 - 20 mA, 1 - 5 V or 2 - 10 V.**

- Setting Range: 000 to 002

Parameter Code	Instruction
000	Stay at the last position when input signal fails or communication protocol timeout.
001	Run to the fully-open position when input signal fails or communication protocol timeout.
002	Run to the fully-closed position when input signal fails or communication protocol timeout.

- Default Setting: 002
- Setting Range:

1. Press "DOWN" several times until PAr displays, press "SET" once to enter parameter setting.
2. Press "UP" or "DOWN" until A IO displays, then press "SET" once to enter signal setting.
3. Press "UP or "DOWN" until AL displays, then press "SET" once to enter signal open circuit action mode.
4. Press and hold "SET" around 3 sec until the display shows the value and flashes.
5. Press "UP" or "DOWN" to adjust the value.
6. Press "SET" to complete the signal open circuit action setting.

Modbus Setting (Optional) [L in]

⚠ Set the input mode setting [SoU] (Pg. 16) to Modbus control first, then follow the Modbus setting steps below.

a. Communication Command Type [Ctr]

- The control signal types are on / off or modulating.
- Setting Range:
  - ➢ [000] : On-off.
  - ➢ [001] : Modulating.
- Default Setting: [000]
- Setting Steps:
  1. Press "DOWN" several times until [PAr] displays, press "SET" once to enter parameter setting.
  2. Press "UP" or "DOWN" until [L in] displays, then press "SET" once.
  3. Press "UP or "DOWN" until [Ctr] displays, then press "SET" once.
  4. Press and hold "SET" around 3 sec until the display shows the value and flashes.
  5. Press "UP" or "DOWN" to select [000] or [001].
  6. Press "SET" to complete the communication command type setting.

b. Communication Baudrate [bAU]

- Modbus baudrate setting.
- Setting Range: [000] to [003]
- Default Setting: [002]
- Setting Steps:
  1. Press "DOWN" several times until [PAr] displays, press "SET" once to enter parameter setting.
  2. Press "UP" or "DOWN" until [L in] displays, then press "SET" once.
  3. Press "UP" or "DOWN" until [bAU] displays, then press "SET" once.
  4. Press and hold "SET" around 3 sec until the display shows the value and flashes.

5. Press "UP" or "DOWN" to select 000 to 003.

Modbus Baudrate	
Parameter Code	**Baudrate (BPS)**
000	9600
001	19200
002	57600
003	115200

6. Press "SET" to complete the communication baudrate setting.

c. Slave ID id

- Modbus slave number setting.
- Setting Range: 2 to 125
- Default Setting: 002
- Setting Steps:
  1. Press "DOWN" several times until PAr displays, press "SET" once to enter parameter setting.
  2. Press "UP" or "DOWN" until L in displays, then press "SET" once.
  3. Press "UP" or "DOWN" until id displays, then press "SET" once.
  4. Press and hold "SET" around 3 sec until the display shows the value and flashes.
  5. Press "UP" or "DOWN" to adjust the value.
  6. Press "SET" to complete the slave ID setting.

d. Communication Protocols Timeout tot

- Communication Protocols timeout setting.
- Setting Range: 0.1 to 99.9 secs.
- Default Setting: 5.0 secs.
- Setting Steps:
  1. Press "DOWN" several times until PAr displays, press "SET" once to enter parameter setting.
  2. Press "UP" or "DOWN" until L in displays, then press "SET" once.
  3. Press "UP" or "DOWN" until tot displays, then press "SET" once.
  4. Press and hold "SET" around 3 sec until the display shows the value and flashes.
  5. Press "UP" or "DOWN" to adjust the value.
  6. Press "SET" to complete the communication protocols timeout setting.

Other Settings: otH

a. Close Direction Setting d ir

- Setting the CLOSE direction of output shaft, either CW or CCW.
- Setting Range:
  - 000: CW.
  - 001: CCW.
- Default Setting: 000
- Setting Steps:
  1. Press "DOWN" several times until PAr displays, press "SET" once to enter parameter setting.
  2. Press "UP" or "DOWN" until otH displays, then press "SET" once.
  3. Press "UP" or "DOWN" until d ir displays, then press "SET" once.
  4. Press and hold "SET" around 3 sec until the display shows the value and flashes.
  5. Press "UP" or "DOWN" to select 000 or 001.
  6. Press "SET" to complete the close direction setting.

b. Time Delay Setting SPd

- Time delay controller enables the running time to be delayed from a standard to required time per system requirements.
- Setting Range: 0 to 999.
- Default Setting: 000
- Setting Steps:

1. Press "DOWN" several times until PAr displays, press "SET" once to enter parameter setting.
2. Press "UP" or "DOWN" until otH displays, then press "SET" once.
3. Press "UP" or "DOWN" until SPd displays, then press "SET" once.
4. Press and hold "SET" around 3 sec until the display shows the value and flashes.
5. Press "UP" or "DOWN" to choose the seconds.

   ⚠ **If the selected setting is less than the rated running time, the actuator will operate based on the rated running time as the minimum running duration.**

6. Press "SET" to complete the time delay setting.

c. Input mode setting SoU

⚠ **Be sure to reset OPEN and CLOSE position according to AUo setting after recalibrating fully-open and fully-closed position or any signal type setting.**

⚠ **If the motor is operating ,then it will stop immediately when switching the Input mode.**

⚠ **If the current position is different to the commanded position, the valve will start operating according to new command or stop immediately after switching to the other mode.**

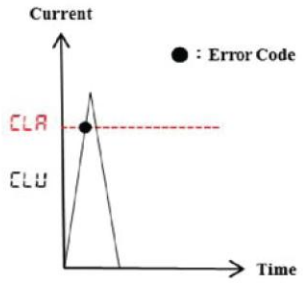
⚠ **If the input mode is changed, adjust the wiring according to the corresponding wiring diagram.**

- Setting the valve control mode to digital input (optional), modulating or Modbus (optional).
- Setting Range:
  - ➢ 000 : Digital input control.
  - ➢ 001 : Modulating control.
  - ➢ 002 : Modbus control.
- Default Setting: 001
- Setting Steps:
  1. Press "DOWN" several times until PAr displays, then press "SET" once to enter signal setting mode.
  2. Press "UP" and "DOWN" until otH displays, then press "SET" once.
  3. Press "UP" and "DOWN" until SoU displays, then press "SET" once.
  4. Press and hold "SET" around 3 sec until the display shows the value and flashes.
  5. Press "UP" or "DOWN" to select 000 to 002.

Parameter Code	Input Mode
000	Digital Input (DI)
001	Modulating
002	Modbus

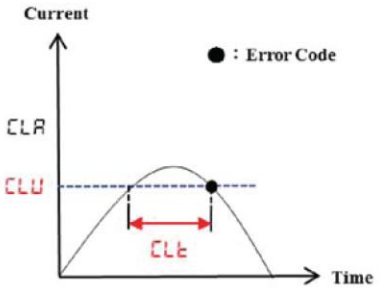
  6. Press "SET" to complete the input mode setting.

d. Motor Over-current (Real Time) CLA



- When the motor current value exceeds the set value, the motor will immediately stop and an error code will be displayed.
- Setting range: 0 to 9.99A
- Default Setting: 1.30
- Setting Steps:
  1. Press "DOWN" several times until PAr displays, press "SET" once to enter parameter setting.
  2. Press "UP" or "DOWN" until otH displays, then press "SET" once.
  3. Press "UP" or "DOWN" until CLA displays, then press "SET" once.
  4. Press and hold "SET" around 3 sec until the display shows the value and flashes.
  5. Press "UP" or "DOWN" to set desired current value.
  6. Press "SET" to complete the motor over-current (real time) setting.

e. Motor Over-current (Delay) CLU



- When the motor current exceeds the set value and remains for a period of time (motor over-current delay time), the motor will immediately stop and an error code will be displayed.
- Setting Range:0 to 9.99A
- Default Setting: .00
- Setting Steps:
  1. Press "DOWN" several times until PAr displays, press "SET" once to enter parameter setting.
  2. Press "UP" or "DOWN" until otH displays, then press "SET" once.
  3. Press "UP" or "DOWN" until CLU displays,then press "SET" once.
  4. Press and hold "SET" around 3 sec until the display shows the value and flashes.
  5. Press "UP" or "DOWN" to set desired current value.
  6. Press "SET" to complete the motor over-current (delay) setting.

f. Delay Time Setting for Motor Over-current CLt

- The delay time for sending an alarm when motor over-current is detected.
- Setting range: 0 to 10 sec
- Default setting: 0.0
- Setting steps:
  1. Press "DOWN" several time until PAr displays, press "SET" once to enter parameter setting.
  2. Press "UP" or "DOWN" until otH displays, then press "SET" once.
  3. Press "UP" or "DOWN" until CLt displays, then press "SET" once.
  4. Press and hold "SET" around 3 sec until the display shows the value and flashes.
  5. Press "UP" or "DOWN" to set delay time.
  6. Press "SET" once to complete the delay time setting for motor over-current.

g. Firmware UEr

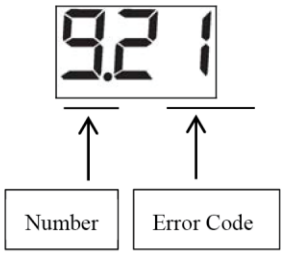
- Display the current firmware version.
- Checking Steps:
  1. Press "DOWN" several times until PAr displays, then press "SET" once to enter parameter setting.
  2. Press "UP" or "DOWN" until otH displays, then press "SET" once.
  3. Press "UP" or "DOWN" until UEr displays, then press "SET" to show the current firmware version.

h. Restore Default Setting [rSt]

- [000]: The current setting value.
- [001]: All parameters are restored to the default settings.
- Setting Steps:
  1. Press "DOWN" several times until [PAr] displays, then press "SET" once to enter parameter setting.
  2. Press "UP" or "DOWN" until [otH] displays, then press "SET" once.
  3. Press "UP" or "DOWN" until [rSt] displays.
  4. Press and hold "SET" around 3 sec until the display shows the value and flashes.
  5. Press "SET" once to show the default settings.
  6. Press "UP" to select [001].
  7. Press "SET" once to restore default setting.

⚠ **Press "MODE" to return to the previous level if restore default setting is not required.**

6.1.7 Warning Messages AL (SEA-3-4-PP/ SEA-4-PP)



- Press "UP" or "DOWN" to switch the numbers from 0 to 9.
- Press and hold "SET" to clean all the error data.
- Press "MODE" to return to return to the first level
- A maximum of 10 records can be recorded. Number 9 is the latest data and number 0 is the oldest data.
- The first digit shows the number of records, and the second and third one show the error code.
- The latest data is listed at the top and the oldest data at the bottom.

Error Code	Warning Message	Solution
17	Limit Position Fault	Refer to 4.4.2 (P.12 to P.17) for adjustment steps setting.
19	Digital Input Fault	Avoid inputting the "ON" digital signal for both open and closed control at the same time.
21	Input Signal Fault	Please set the correct input signal type.
22	Output Signal Fault	Please refer to the wiring diagram to confirm whether the input signal is connected correctly. ("AO -"to "AO+").
23	Flash Memory and Operating Status Fault	Replace a new modulating board.
25	MODBUS Timeout	Please check whether the main system control is normal.
27	Low Input Voltage	1. Confirm the supply power. 2. Replace a new power board.
30	Installation Error of Potentiometer	Contact the seller.
31	Positioning Fault	Refer to 6.1.6.1 g (P. 29) for sensitivity setting.

	OPEN Potentiometer Fault.	Confirm that if the torque is overloaded or the motor is locked. If this problem cannot be solved, please contact the seller.
	CLOSE Potentiometer Fault.	Confirm whether the torque is overloaded or the motor is locked. If the issue cannot be resolved, please contact the seller.
	Abnormal Current for Open Direction	Operate the handwheel to confirm if the valve is stuck by foreign objects.
	Abnormal Current for Closed Direction	Operate the handwheel to confirm if the valve is stuck by foreign objects.
	Signal Open Circuit	Confirm whether the input signal is connected.

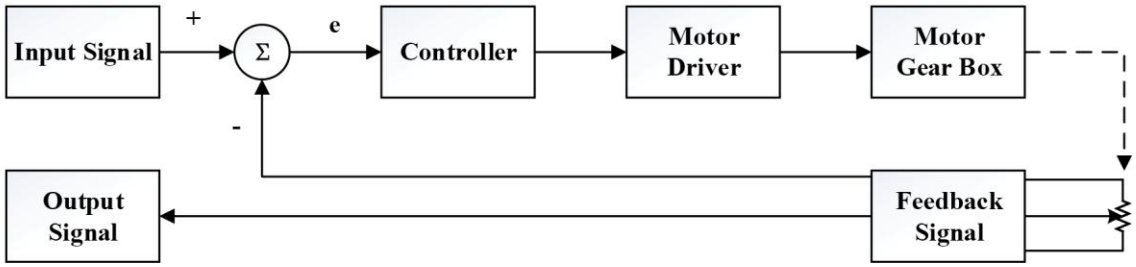
New Modulating Control Board

Modulating Control Board (SEA-8-PP to SEA-132-PP)

Surface

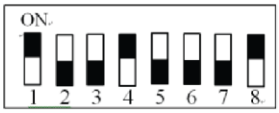
The layout is based on 110 / 220 V AC.

Programming



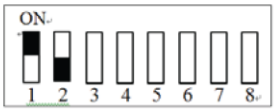
Dip Switch Setting (SW1)

The Dip Switch SW1 is a combination of 8 switches and equally divided in two rows. It is utilized to select signal type of input as well as output and fail positioning when the signal input fails. The sliders can be placed at either ON (upper) or OFF (lower) state position. Factory settings are switches 1, 4, 8 at ON state and switches 2, 3, 5, 6, 7 at OFF state.



	1	2	3	4	5	6	7	8
Factory Setting	ON	OFF	OFF	ON	OFF	OFF	OFF	ON
4 - 20 mA input	ON	OFF						
1 - 5 V input	OFF	OFF						
2 - 10 V input	OFF	ON						
4 - 20 mA output			OFF	ON	OFF			
2 - 10 V output			ON	OFF	ON			
Closed direction setting: CW						OFF		
Closed direction setting: CCW						ON		
When signal input failed, driving valve to fully-open							ON	OFF
When signal input failed, driving valve to fully-closed							OFF	ON
When signal input failed, valve stays at the last position							ON	ON
							OFF	OFF

a. Input signal setting (Switches 1 - 2)



Input Signal	State of Switch
4 - 20 mA	1 at ON, 2 at OFF
1 - 5 V	1 at OFF, 2 at OFF
2 - 10 V	1 at OFF, 2 at ON

b. Output signal setting (Switches 3 - 5)

- Output signal can be fine-tuned by VR2.
- When resetting the Output Signal, be sure to fine-tune VR2 to match the setting either 2 – 10 V or 4 - 20 mA.

Output Signal	State of Switch
4 - 20 mA	3 at OFF, 4 at ON, 5 at OFF
2 - 10 V	3 at ON, 4 at OFF, 5 at ON

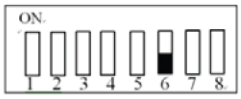
c. Close direction setting (switch 6)

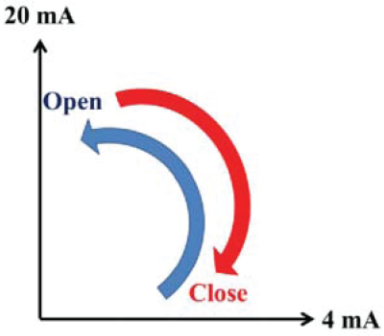
- When S6 is set to OFF, the close direction is CW (clockwise).
- When S6 is set to ON, the close direction is CCW (counterclockwise).

⚠ **The input signal type is set by switches 1 and 2. And switch 6 is used to set the corresponding relationship between value of input signal and operation direction of actuator as shown in the figure below, e.g., 4 - 20 mA input signal.**

⚠ **The operating direction of the actuator has been set and calibrated at the factory. Be sure to change the direction of the position indicator if different operating direction is required.**

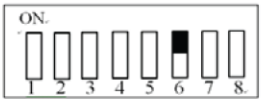
When S6 is set to OFF

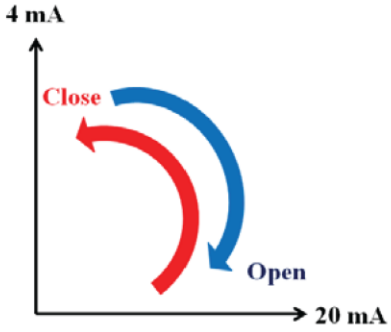




Position Indicator (Fully-Open→Fully-Closed)	Operating Position	Input Signal	LED	Output Signal
CW	**Fully-Closed**	1 V, 2 V, 4 mA	**LD1 ON**	2 V, 4 mA
	Fully-Open	5 V, 10 V, 20 mA	**LD2 ON**	10 V, 20 mA

When S6 is set to ON





Position Indicator (Fully-Open→Fully-Closed)	Operating Position	Input Signal	LED	Output Signal
CCW	**Fully-Closed**	1 V, 2 V, 4 mA	**LD1 ON**	2 V, 4 mA
	Fully-Open	5 V, 10 V, 20 mA	**LD2 ON**	10 V, 20 mA

d. Failed position setting while the input signal failed. (switches 7 and 8)

- When a low signal value is received, the actuator operates toward fully-open position and when a high signal value is received, the actuator operates toward fully-open position.

Input Signal	Fully-Open	Fully-Closed
4 - 20 mA	4 mA	20 mA
1 - 5 V	1 V	5 V
2 - 10 V	2 V	10 V

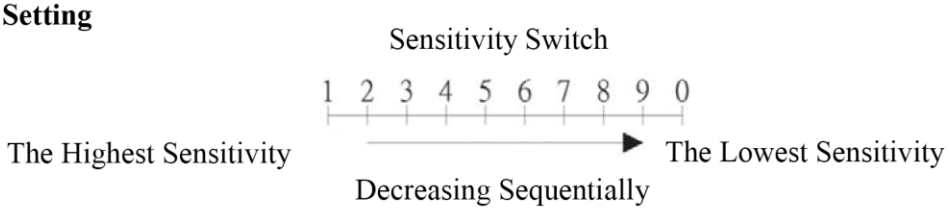
- The selection of the fail position while the input signal failed, please follow table below:

Signal Failed Position	State of Switch
Fully-Open	7 at ON, 8 at OFF
Fully-Closed	7 at OFF, 8 at ON
The Last Position	7 at ON, 8 at ON 7 at OFF, 8 at OFF

Sensitivity Switch Setting (SW2)

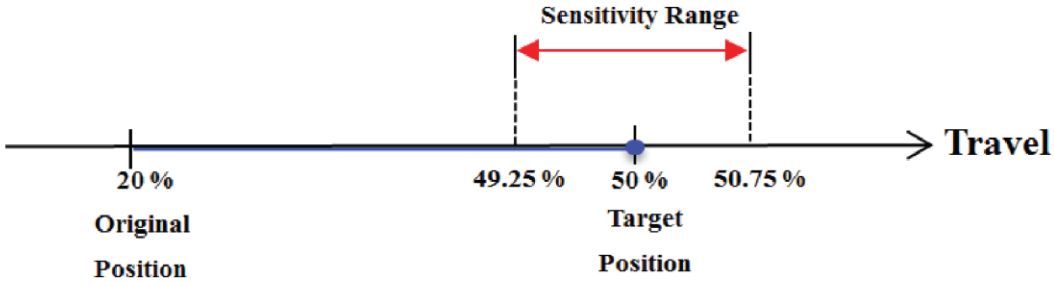
- When the sensitivity is higher, the resolution of the input signal will be higher, and relatively the dead band will be smaller. Excessive high resolution may cause the actuator to keep hunting and could not run to the desired position which will lead to the thermostat inside the motor to trip because of overheating, and finally the actuator will shut down. If this situation happens, it is suggested to adjust the sensitivity setting.

a. Setting



Setting Value	1	2	3	4	5	6	7	8	9	0
Sensitivity (%)	0.25	0.5	0.75	1	1.25	1.5	1.75	2	2.25	2.5

- When switched to "1": The Highest Sensitivity.
- When switched to "0": The Lowest Sensitivity.
- For example: When the sensitivity switch is set to "3" (0.75%) and the target position is 50%, the valid sensitivity range will be from 49.25% to 50.75% (50% ± 0.75%) as shown in the figure below.



b. Original Factory Setting

- SEA-8-PP - SEA-132-PP

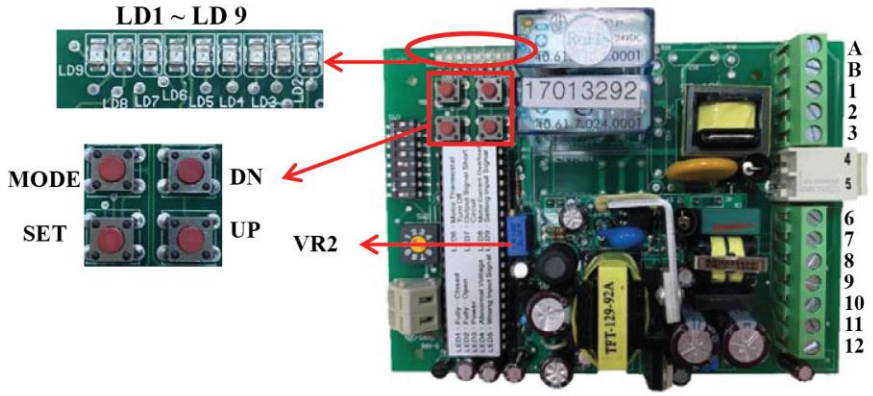
Model	Figure
SEA-8-PP to SEA-132-PP	

Signal Setting for Open and Close Position

⚠ **These settings are set and calibrated at the factory. Be sure to reset the Signal Setting for Open and Close Position when recalibrating TC1 and TC2 for fully-open and fully-closed position or other signal types are required.**

⚠ **Use a multimeter to measure the output signal in accordance with the selected signal type.**

- Using UP, DN, MODE, SET buttons to set the open and close position.



Lamp	Status	Lamp	Status
LD1	Fully-closed	LD6	Motor thermal protector activated.
LD2	Fully-open	LD7	Output signal short circuit
LD3	Power	LD8	Overcurrent in motor
LD4	Abnormal input voltage	LD9	Local setting mode
LD5	Wrong input signal		

Press and hold "SET" button for 2 seconds until LD 9 lights to enter local setting mode.

ⓘ **Please adjust the signal setting for fully-open position first, then adjust the signal setting for fully-closed position.**

- **Signal setting for Fully-OPEN position**
  a. Press and hold "UP" button to operate the actuator to open until it has reached fully-open position and LD2 lights and then input a signal 5 V or 10 V or 20 mA.
  b. Press "MODE" button for 2 seconds until LD2 flashes to complete the setting of fully-open position.

- **Signal setting for Fully-CLOSED position**
  a. Press and hold "DN" button to operate the actuator to close until it has reached fully-closed position and LD1 lights and then input a signal 1 V or 2 V or 4 mA.
  b. Press "MODE" button for 2 seconds until LD1 flashes to complete the setting of fully-closed position.

ⓘ **See below description for VR2 adjustment:**

VR2 ↻ Clockwise: decreasing signal value.
↺ Counter-clockwise: increasing signal value.

After completing the above settings, press "SET" button to quit local setting

Troubleshooting of Modulating Controller

⚠ **In case LD3 does not light or any of LD4 to LD9 lights when the actuator is motorized, please refer to steps below for basic troubleshooting.**

⚠ **Please do the troubleshooting when LD4 to LD8 lights, and then restart the power to turn the lights off.**

Status of LEDs	Possible problems	Solution
LD3 does not go on	a. No power supplied. b. Modulating controller failed.	a. Check the power supply as well as wires connected to terminals #4 & #5. b. Send back to factory for inspection.
LD4 goes on (for 24V units)	The voltage is under 19.8 V DC.	Verify that the input voltage is within the allowable voltage deviation.
LD5 goes on	a. An incorrect signal type inputted. For example, preset with 2-10 V input but input 4-20 mA. b. Input a voltage exceeding the rated. For example, preset with 2-10 V input but input 13.5V. c. An incorrect signal type inputted. For example, preset with 4 - 20 mA input but input 2 - 10V. In this case, the actuator still works in 2 - 7V. When the signal is over 7.2 V, the LD5 lights.	Verify if the switch 1 is set in accordance with the type of input signal. Please refer to Pg. 36.
LD6 goes on	Motor thermal protector started.	a. The duty cycle exceeded the rating. b. The contact of motor thermal protector (MOT) disconnected.

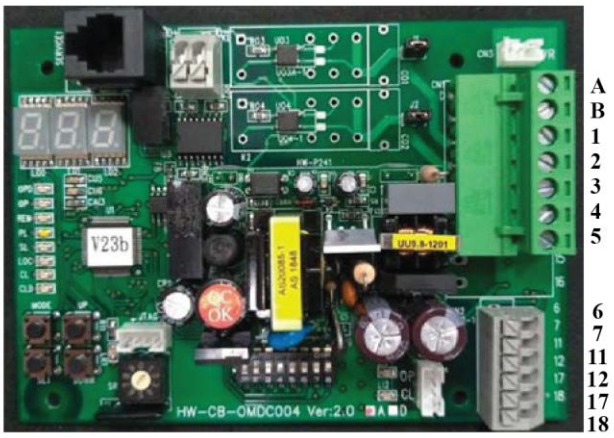
Status of LEDs	Possible problems	Solution
LD7 goes on	a. Signal output short circuits. b. Both DIP switch #3 and #4 are set at ON or OFF.	a. Verify if the signal output with reversed polarity. The negative pole should be connected to terminal #11 and the positive pole should be connected to terminal #12. b. Reset the dip switches per actual output signal. Please refer to Pg. 36.
LD8 goes on	Motor over-current.	a. Duty cycle exceeded the rating. Reduce the duty rating. b. Check the load. c. Check if the motor rotor is locked (For example: Valve is stuck by foreign objects).
LD9 goes on	Local setting mode - Setting position for open & close.	After completing the settings, press "SET" button to quit.

SEA-8-PP - SEA-132-PP Modbus Modulating Control Board (Optional)

Surface

The layout is based on 110 / 220 V AC.

Duty Cycle 30%



Duty Cycle 75%

Dip Switch Setting (SW)

The Dip Switch SW is a combination of 8 switches and equally divided in two rows. It is utilized to select signal type of input as well as output and fail positioning when the signal input fails. The sliders can be placed at either ON (upper) or OFF (lower) state position. Please follow steps below if an adjustment of these settings are required.

ⓘ **Please restart the actuator after adjusting.**

ⓘ **Modbus and Modulating Control could not be used at the same time.**

	1	2	3	4	5	6	7	8
MODBUS	ON	ON	OFF	OFF	OFF	OFF	OFF	OFF
4 - 20 mA input	ON	OFF						
1 - 5 V input	OFF	OFF						
2 - 10 V input	OFF	ON						
4 - 20 mA output			OFF	ON	OFF			
2 - 10 V output			ON	OFF	ON			
Input 20 mA / 5 V / 10 V to operate valve to fully-open position.						OFF		
Input 20 mA / 5 V / 10 V to operate valve to fully-closed position						ON		
When signal input failed, driving valve to fully-open (when S6 is set at " ON").							OFF	ON
When signal input failed, driving valve to fully-closed (when S6 is set at " ON").							ON	OFF
When signal input failed, driving valve to fully-closed (when S6 is set at " OFF").							OFF	ON
When signal input failed, driving valve to fully-open (when S6 is set at " OFF").							ON	OFF
When signal input failed, valve stays at the last position.							ON	ON

- **MOBUS:**

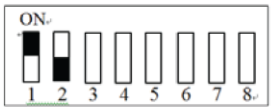
  Set switches 1, 2 at ON state and switches 3, 4, 5, 6, 7, 8 at OFF state.

- **Modulating Control:**

  Set switches 1, 4, 8 at ON state and switches 2, 3, 5, 6, 7 at OFF state.

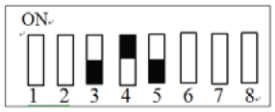
To enable Analog Modulation：

a. Input Signal Setting (switches 1 - 2)



Input Signal	State of Switch
4 - 20 mA	1 at ON, 2 at OFF
1 - 5 V	1 at OFF, 2 at OFF
2 - 10 V	1 at OFF, 2 at ON

b. Input Signal Setting (switches 3 - 5)



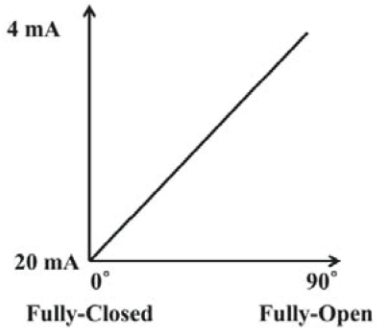
Output Signal	State of Switch
4 - 20 mA	3 at OFF, 4 at ON, 5 at OFF
2 - 10 V	3 at ON, 4 at OFF, 5 at ON

c. Setting of fail position when input signal fails (Switches 6 - 8)

⚠ **The input signal type is set by switches 1 and 2. And switch 6 is used to set the corresponding relationship between value of input signal and operation direction of actuator.**

When S6 is set to ON

- The program defines 20 mA / 5 V/ 10 V as a command for fully-closed positioning. The line graph below shows the signal level and the corresponding position of the actuator.



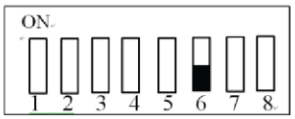
- When a low signal value received, the actuator operates toward fully-open position and when a high signal value received, the actuator operates toward fully-closed position.

Input Signal	Fully-Open (90°)	Fully-Closed (0°)
4 - 20 mA	4 mA	20 mA
1 - 5 V	1 V	5 V
2 - 10 V	2 V	10 V

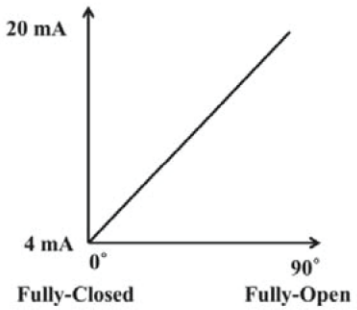
- The selection of the fail position while the input signal failed, please follow table below:

Signal Failed Position	State of Switch
Fully-Open (90°)	7 at OFF, 8 at ON
Fully-Closed (0°)	7 at ON, 8 at OFF
The Last Position	7 at ON, 8 at ON

When S6 is set to OFF



- The program defines 20 mA / 5 V / 10 V as a command for fully-open positioning. The line graph below shows the signal level and the corresponding position of the actuator.



- When a high signal value received, the actuator operates toward fully-open position and when a low signal value received, the actuator operates toward fully-closed position.

Input Signal	Fully-Open (90°)	Fully-Closed (0°)
4 - 20 mA	20 mA	4 mA
1 - 5 V	5 V	1 V
2 - 10 V	10 V	2 V

- The selection of the fail position while the input signal failed, please follow table below：

Signal Failed Position	State of Switch
Fully-Open (90°)	7 at ON , 8 at OFF
Fully-Closed (0°)	7 at OFF, 8 at ON.
The Last Position	7 at ON , 8 at ON.

Sensitivity Switch Setting (SR1)

- SEA-8-PP to SEA-132-PP Factory setting:
  Select "MODBUS" control, the sensitivity is preset to 1.
  Select "analog signal" control, the sensitivity is preset to 7.

LED Indication

Lamp	Actuator Status
OPD	Fully-Open Position
OP	Opening Direction
REM	Remote Control Mode
PL	Alerting Signal
SL	Setting Mode
LOC	Local Control Mode
CL	Closing Direction
CLD	Fully-Closed Position
LR1	MCU Indication

Travel Setting

- Press “MODE” 5 times to get into AUo.
- Press and hold “SET” around 5 sec until “LOC” comes on to enter Auto setting mode.
- When the Auto setting is completed, “LOC” comes off and the actuator stops running The travel setting is completed.

Signal Setting

⚠ **If the travel end positions have not been set up properly per Pg. 48 follow steps below to recalibrate.**

- **Input signal setting for fully-closed position**
  a. Press "MODE" several times until [Io] displays, then press "SET" once to enter signal setting mode.
  b. Press "UP" or "Down" until [2r 1] displays.
  c. Press and hold "SET" around 3 sec until [2r 1] flashes.
  d. Input signal according to the dip switch setting (1 V or 2 V or 4 mA).
  e. Press "SET" once and then "MODE" 2 times to complete the input signal setting for fully-closed position.

- **Input signal setting for fully-open position**
  a. Press "MODE" several times until [Io] displays, then press "SET" once to enter signal setting mode.
  b. Press "UP" or "DOWN" until [FU 1] displays.
  c. Press and hold "SET" around 3 sec until [FU 1] flashes.
  d. Input signal according to the dip switch setting (5 V or 10 V or 20 mA).
  e. Press "SET" once and "MODE" 2 times to complete the input signal setting for fully-open position.

- **Output signal setting for fully-closed position**
  ⚠ **Use a multimeter to measure the output signal in accordance with the selected signal type.**
  a. Press "MODE" several times until [Io] displays, then press "SET" once to enter signal setting mode.
  b. Press "UP" or "DOWN" until [2Fo] displays.
  c. Press and hold "SET" around 3 sec.
  d. Select signal value by pressing "UP" or "DOWN" until the required value is achieved.
  e. Press "SET" once and "MODE" 2 times to complete the output signal setting for fully-closed position.

- **Output signal setting for fully-open position**
  ⚠ **Use a multimeter to measure the output signal in accordance with the selected signal type.**
  a. Press "MODE" several times until [Io] displays, then press "SET" once to enter signal setting mode.
  b. Press "UP" or "DOWN" until [FFo] displays.
  c. Press and hold "SET" around 3 sec.
  d. Select signal value by pressing "UP" or "DOWN" until the required value is achieved.
  e. Press "SET" once and "Mode" 2 times to complete the output signal setting for fully-open position.

Warning Message

a. Press "MODE" once until AL displays, then press "SET" once to get into warning message.

b. Press "UP" or "DOWN" to review the history log of warning message.

Item (99,98,97…0)	Warning Message	Solution
99 98 (The latest data) 97 96 95 94 93 92 91 90 ⋮ 0 (The oldest data)	.1 Abnormal Input signal.	Check if the input signal and dip switch settings are correct.
	2 Overcurrent signal.	a. Check the PCBA is normal or not. b. Check if the actuator operates normally. If not, please contact the seller.
	3 Motor over temperature signal.	a. Check the motor is normal or not. b. Confirm that the motor operates under correct duty cycle rating. c. Check if the actuator operates normally. If not, please contact the seller.
	.0 No abnormal records.	

⚠ **The latest data is listed at the top, the oldest data at the bottom.**

- **Example 2**

a. If you want to check the latest data, press "MODE" several times until AL displays ☒ Press "Set" once ☒ The LED display will show the latest data 99.

b. If you want to check the eighth data, press "MODE" several times until AL displays ☒ Press "SET" once ☒ Press "DOWN" seven times and the LED display will show the eighth data 92.

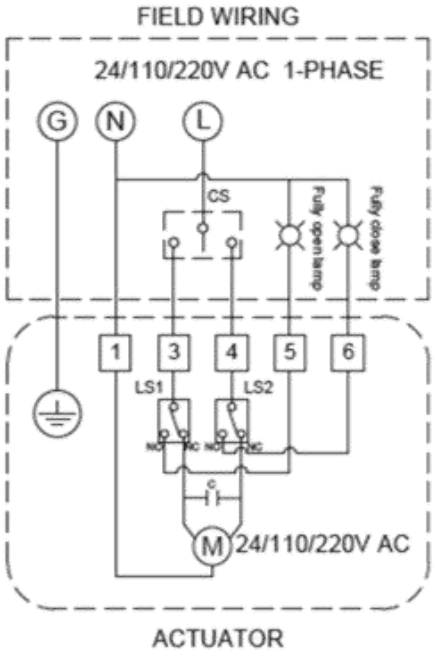
MODBUS Parameter Address

Parameter Address (Hexadecimal)	Function	Setting range (Hexadecimal)
5	Station setting for MODBUS	1 to 127 station
6	Baud rate setting for MODBUS	4 to 5
8	Position setting (%)	0 to 64
9	Position feedback (%)	0 to 64

WIRING DIAGRAMS

The wiring diagrams provided are for the Sharpe® standard actuators, for special order actuators or versions not listed please contact Sharpe® Valves for the correct wiring diagram or refer to the diagram inside the actuator cover.

➢ SEA 1- 24/110/220V AC



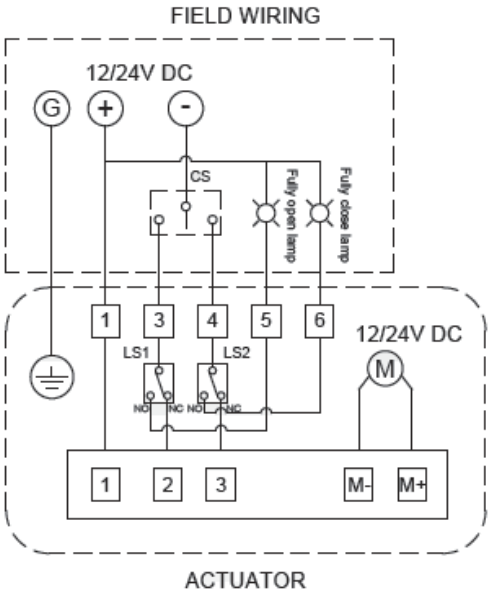
- Use proper wire size and fuse to prevent actuator failure. The data is provided below to assist on the selection of the proper wire and fuse.

Wire Gage	Max Current	Fuse
24(0.205mm²)	3A	2A

TERMINALS:
N connects to 1.
L connects to 3 for OPEN.
L connects to 4 for CLOSE.

LS - Limit switch.
CS - Control switch or relay.

➢ SEA 1- 12/24V DC



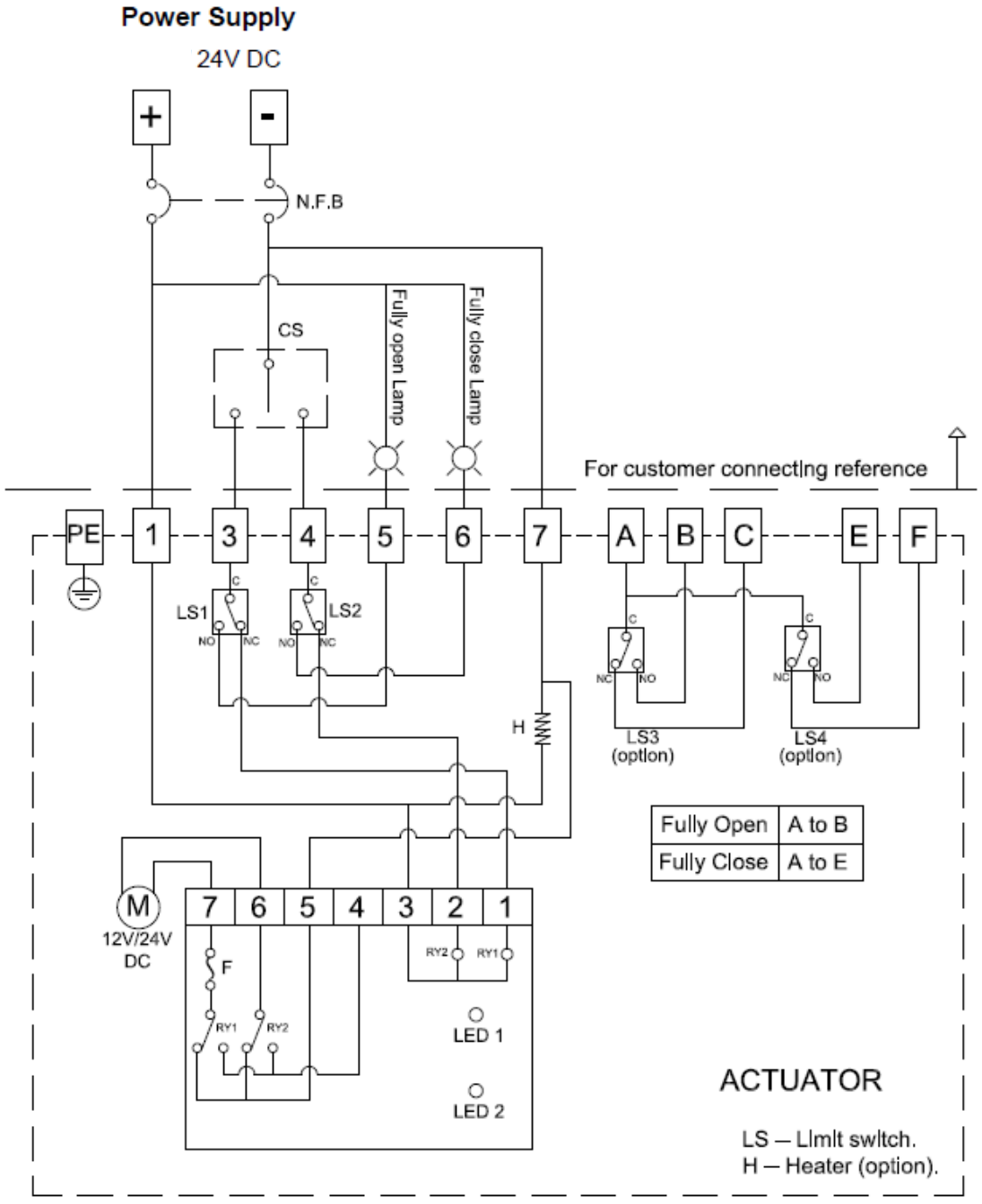
- Use proper wire size and fuse to prevent actuator failure. The data is provided below to assist on the selection of the proper wire and fuse.

Wire Gage	Max Current	Fuse
24(0.205mm²)	3A	2A

TERMINALS:
N connects to 1.
L connects to 3 for OPEN.
L connects to 4 for CLOSE.

LS - Limit switch.
CS - Control switch or relay.

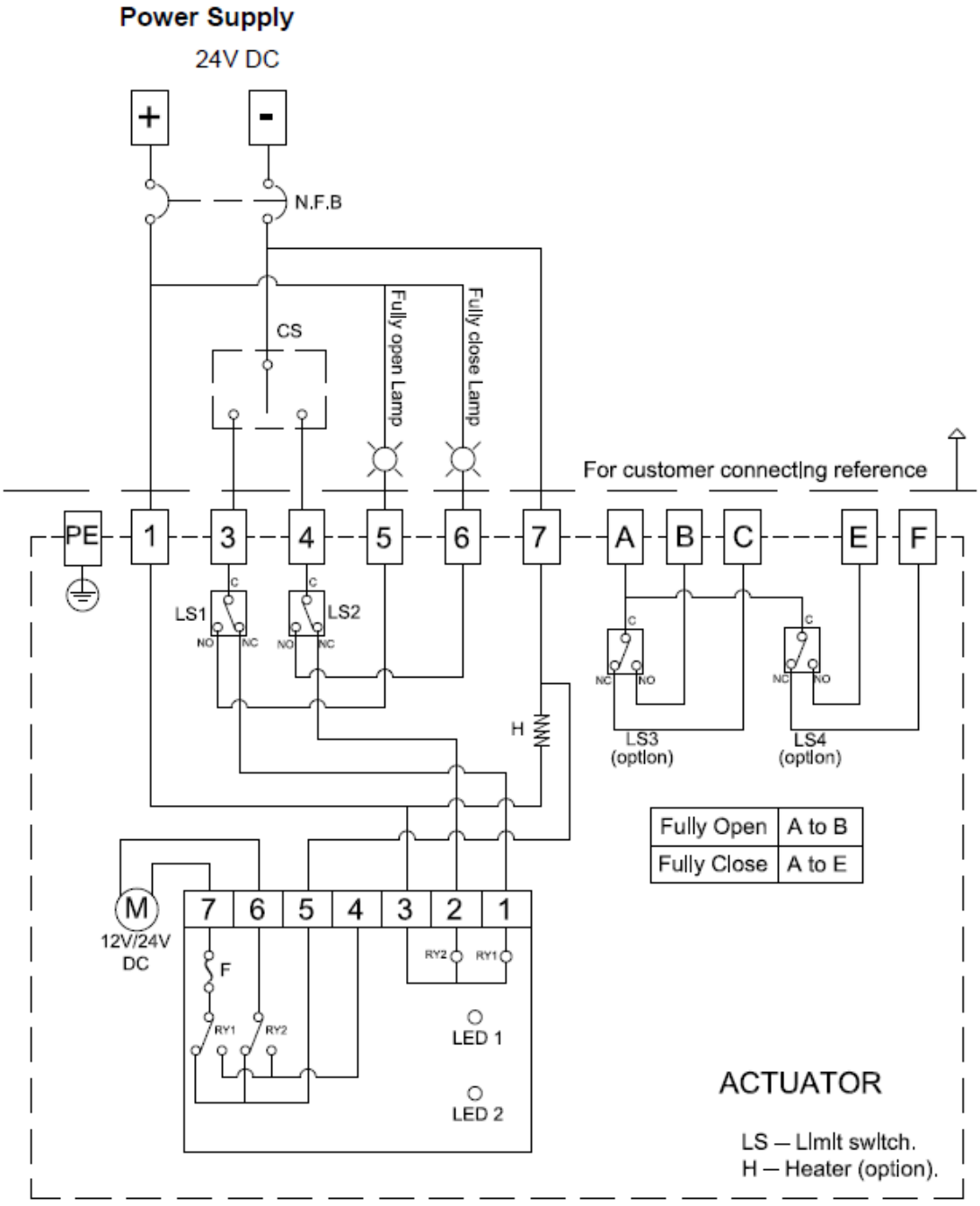
➢ SEA 3-4: 24V DC – 30% Duty Cycle



NOTE:

1. "+" connects to #1, "–" connects to #7.
2. "–" connects to #3 for "OPEN", "–" connects to #4 for "CLOSE".
3. Using less than 3A current for "A, B, C, E, F".
4. Using battery to supply power for DC units.

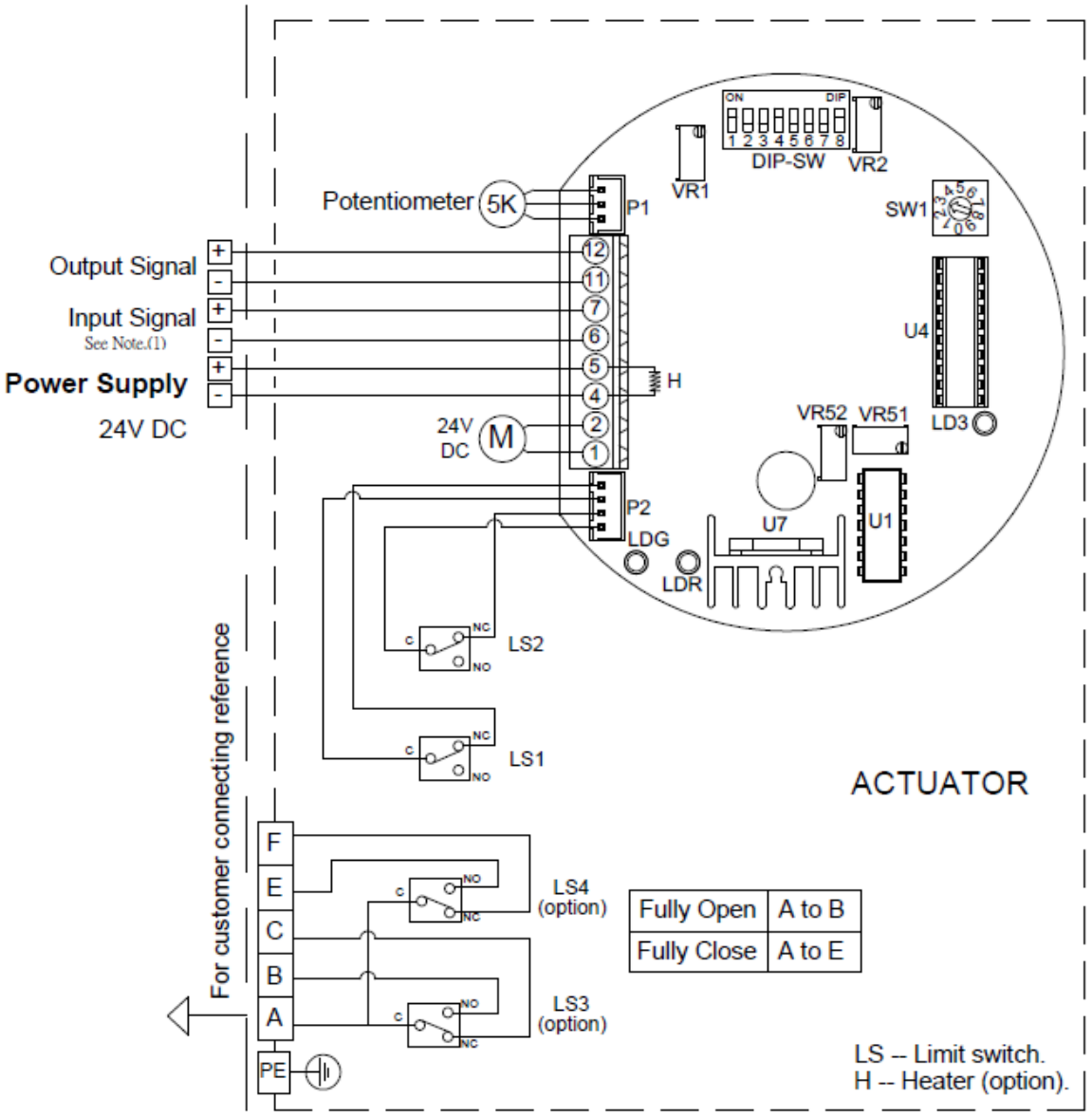
➢ SEA 4-4: 24V DC – 30% Duty Cycle



NOTE:

1. "+" connects to #1, "–" connects to #7.
2. "–" connects to #3 for "OPEN", "–" connects to #4 for "CLOSE".
3. Using less than 3A current for "A, B, C, E, F".
4. Using battery to supply power for DC units.

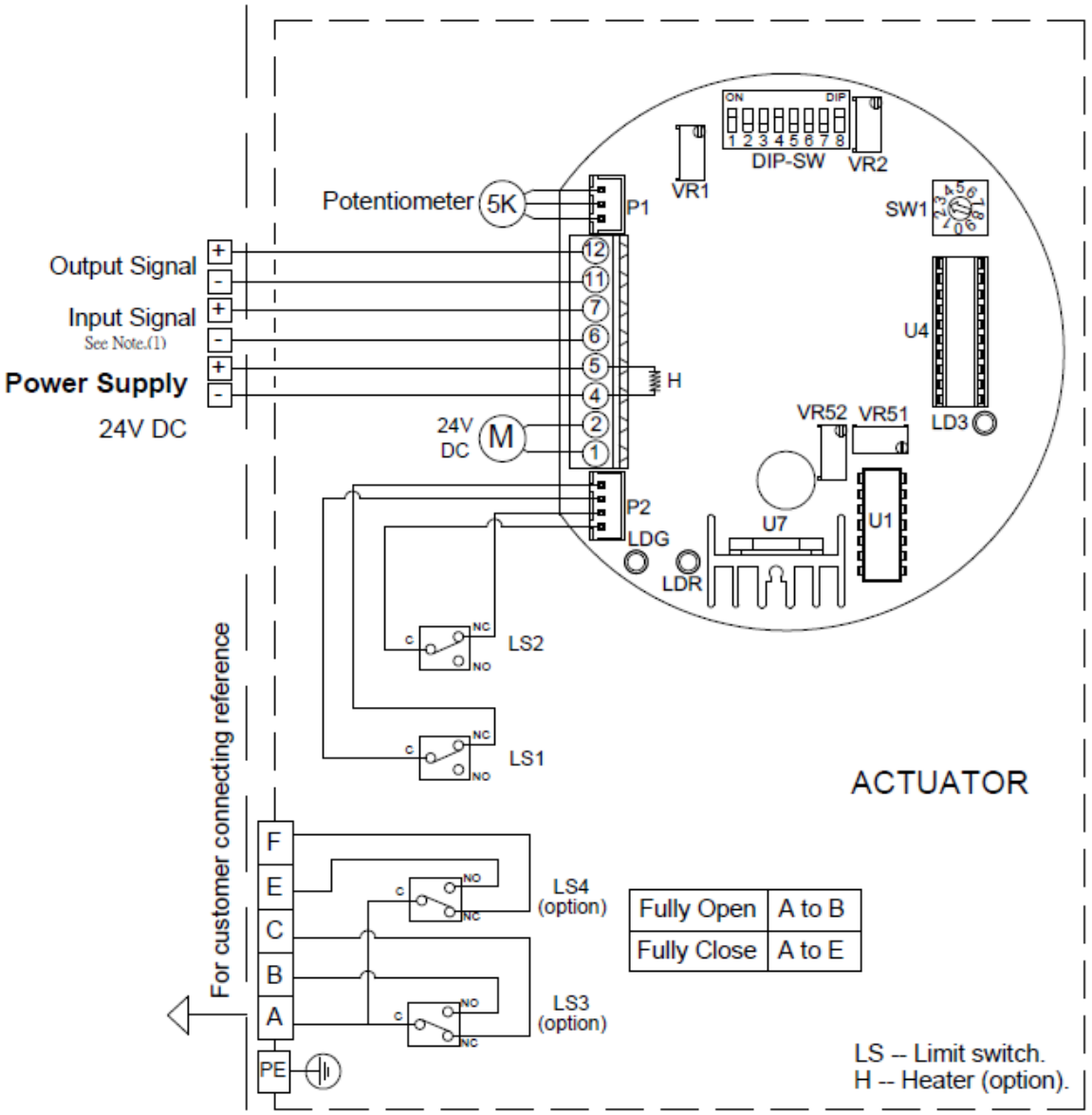
➢ SEA 3-4-PP: 24V DC – 75% Duty Cycle Modulating Controller



NOTE :

1. **Modulating Board**
   a. Input Signal : 4~20mA, 1~5V, 2~10V
      (It is suggested to use the shielding wire and its length should not exceed 30m.)
   b. Output Signal : 4~20mA, 2~10V
2. Using less than 3A current for "A, B, C, E, F".
3. Using battery to supply power for DC units.

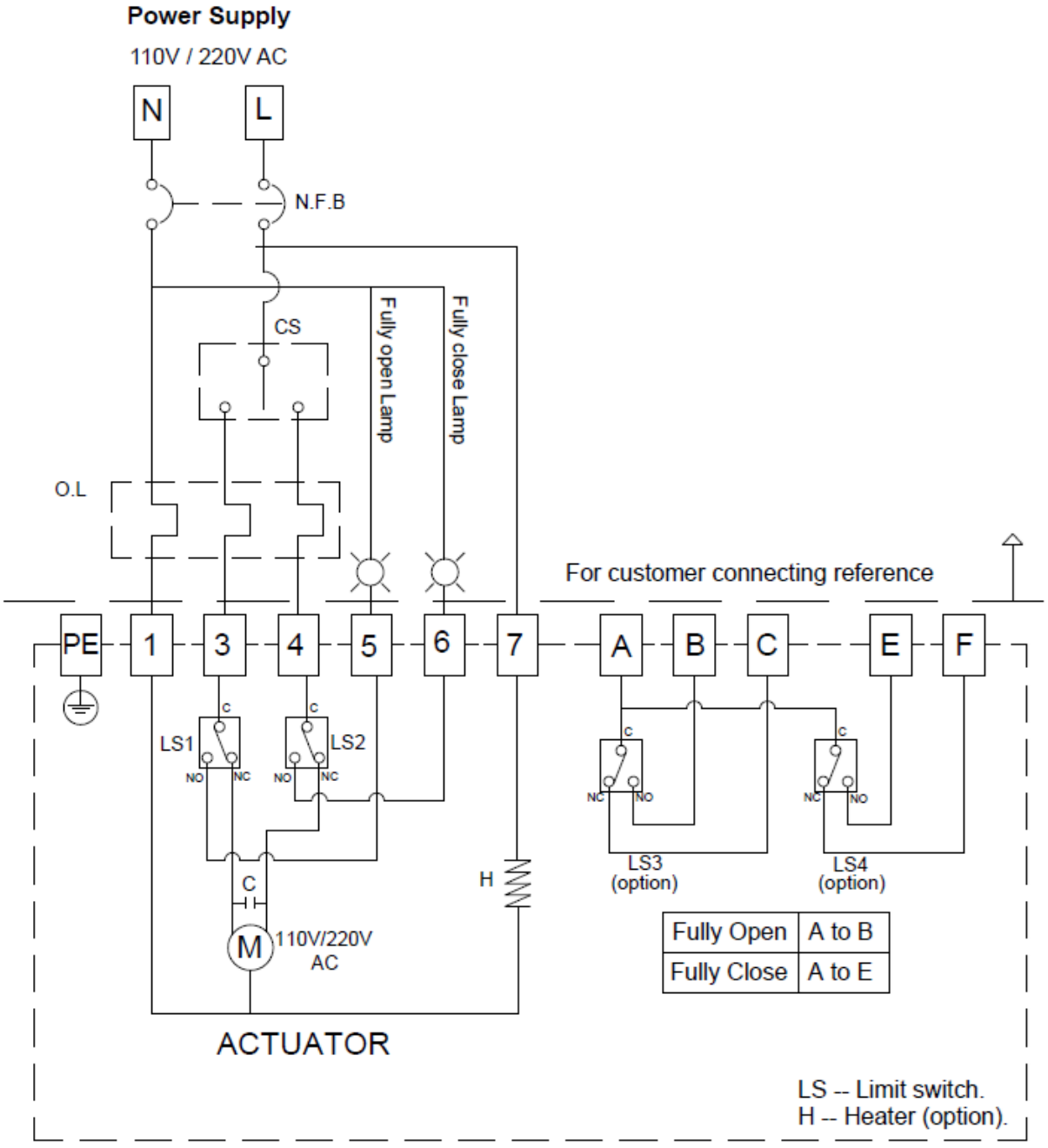
➢ SEA 4-4-PP: 24V DC – 75% Duty Cycle Modulating Controller



NOTE :

1. **Modulating Board**
   a. Input Signal : 4~20mA, 1~5V, 2~10V
   (It is suggested to use the shielding wire and its length should not exceed 30m.)
   b. Output Signal : 4~20mA, 2~10V
2. Using less than 3A current for "A, B, C, E, F".
3. Using battery to supply power for DC units.

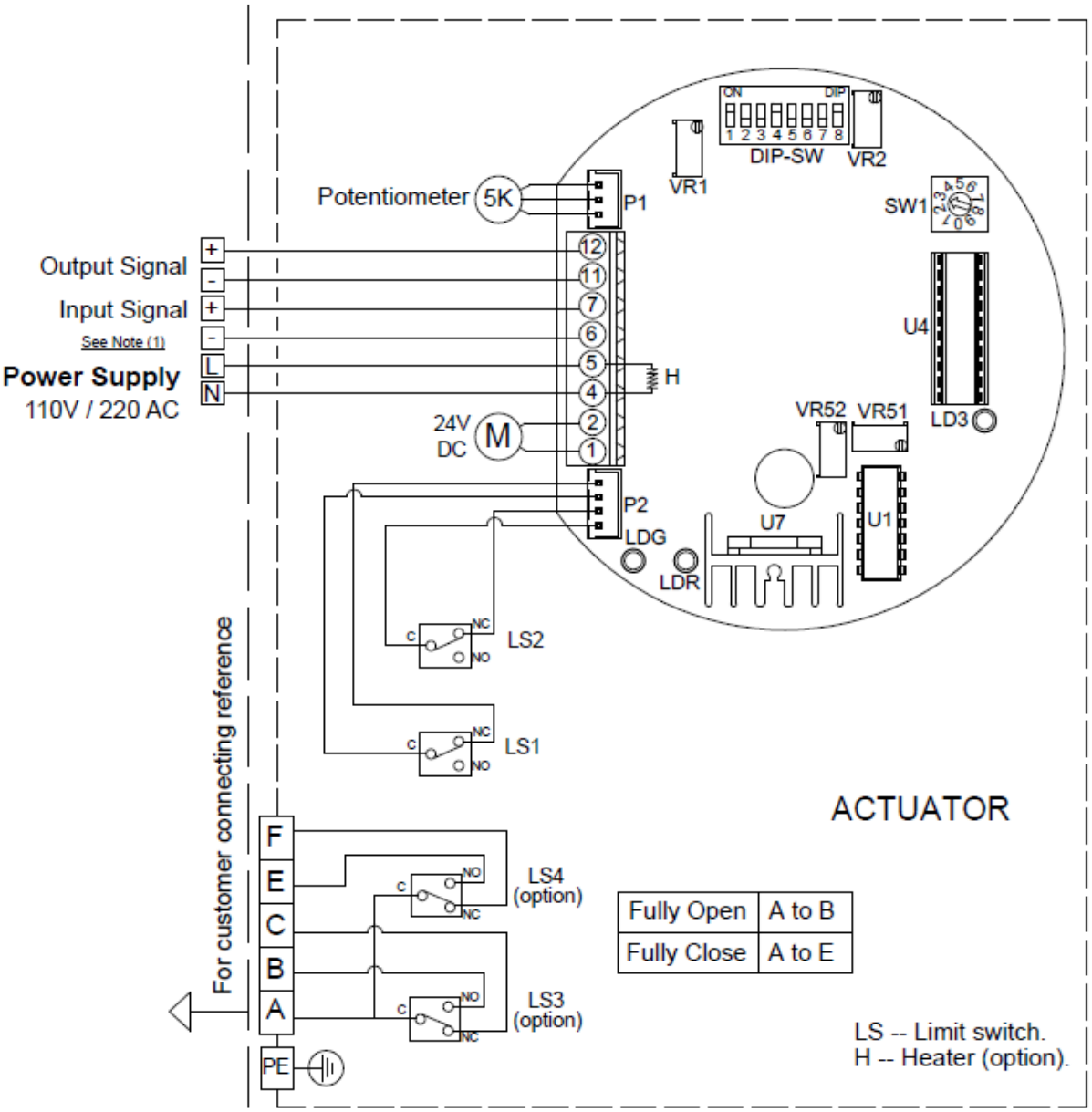
➢ SEA 3 & SEA 4: 110V / 220V AC – 30% Duty Cycle



NOTE :

1. "N" connects to #1, "L" connects to #7.
2. "L" connects to #3 for "OPEN", "L" connects to #4 for "CLOSE".
3. Using less than 3A current for "A, B, C, E, F".

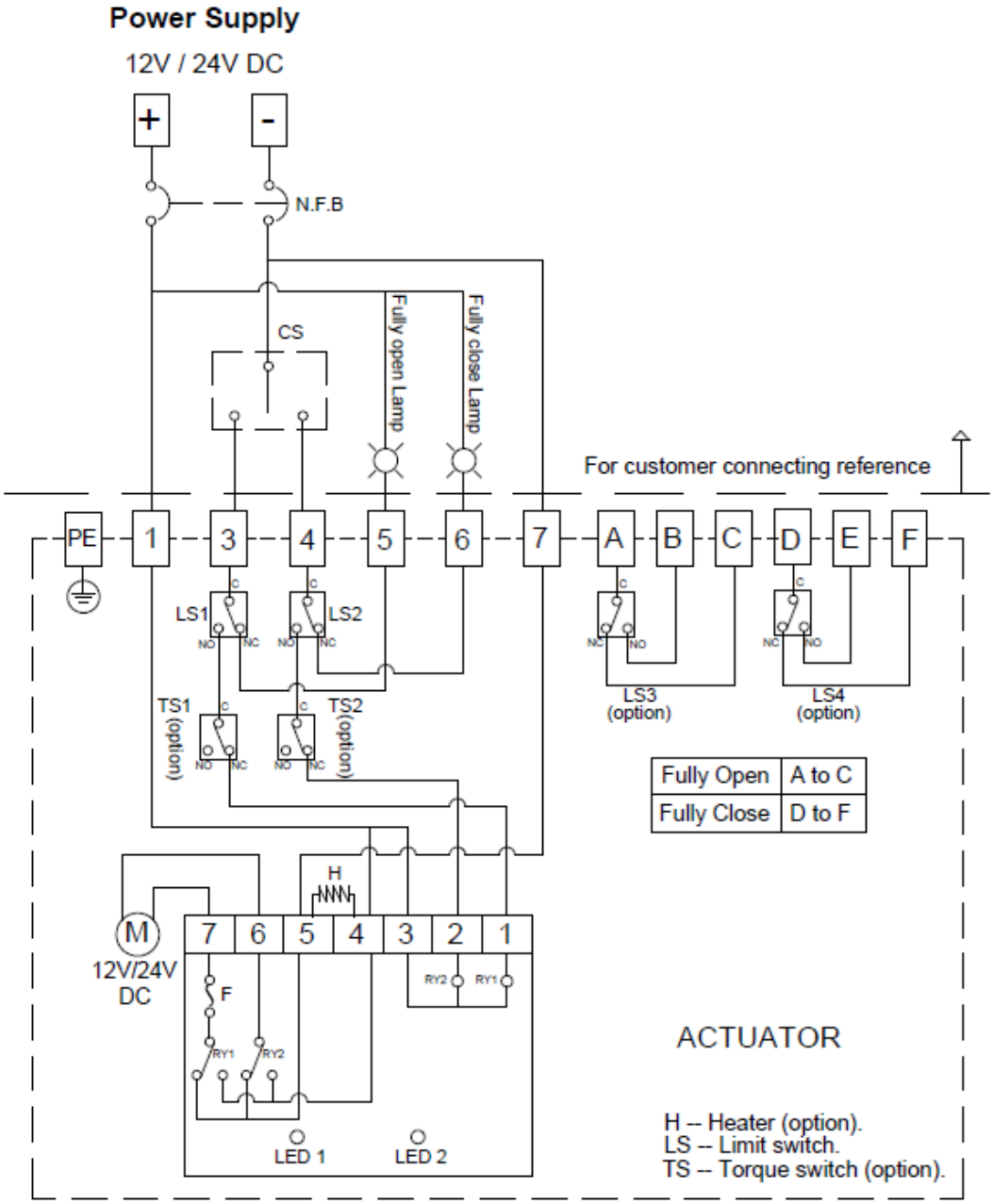
➢ SEA 3-PP & SEA 4-PP: 110V / 220V AC-75% Duty Cycle Modulating Controller



NOTE:

1. **Modulating Board**
   a. Input Signal：4~20mA, 1~5V, 2~10V
   (It is suggested to use the shielding wire and its length should not exceed 30m.)
   b. Output Signal：4~20mA, 2~10V
2. Using less than 3A current for “A, B, C, E, F”.

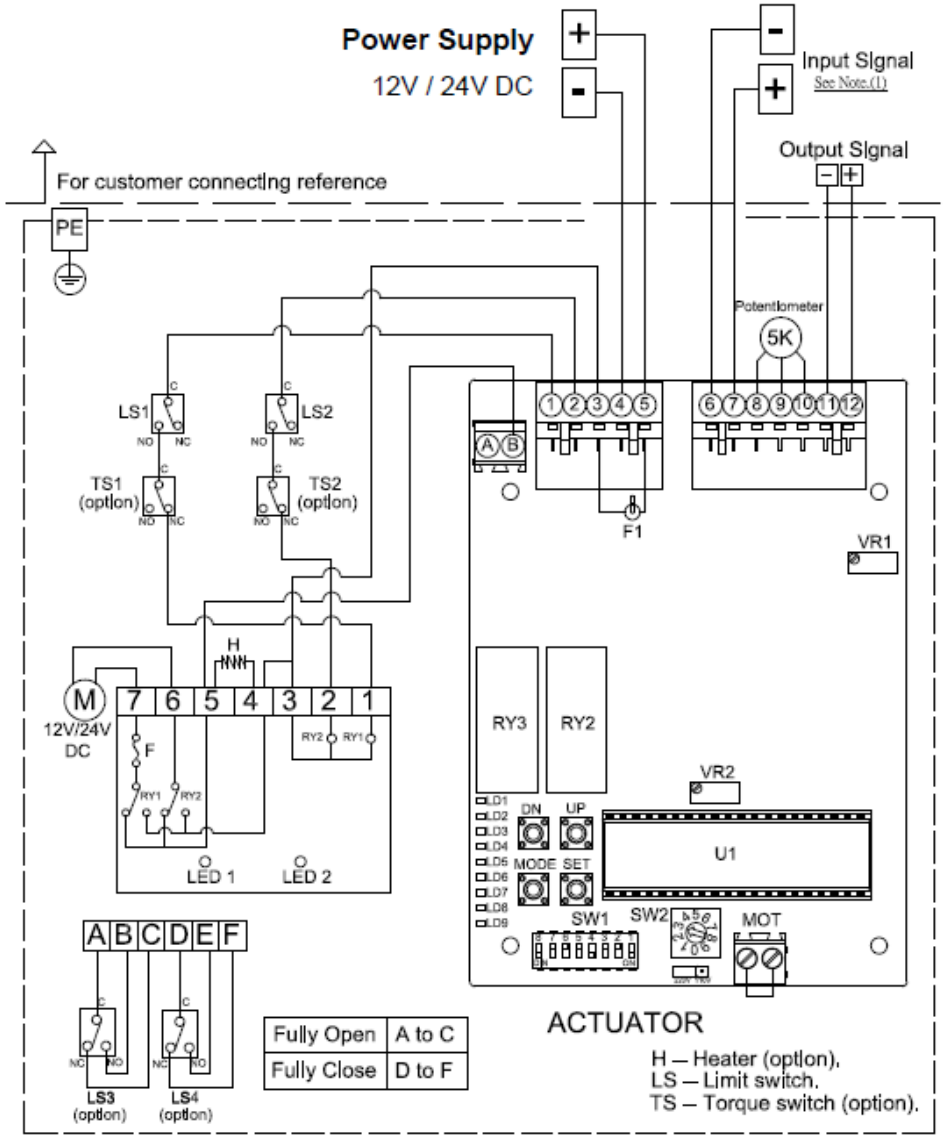
➢ SEA 8 – SEA 132: 12V / 24V DC – 30% Duty Cycle



NOTE:

1. "+" connects to #1, "–" connects to #7.
2. "–" connects to #3 for "OPEN", "–" connects to #4 for "CLOSE".
3. Using less than 5A current for "A, B, C, D, E, F".
4. Using battery to supply power for DC units.

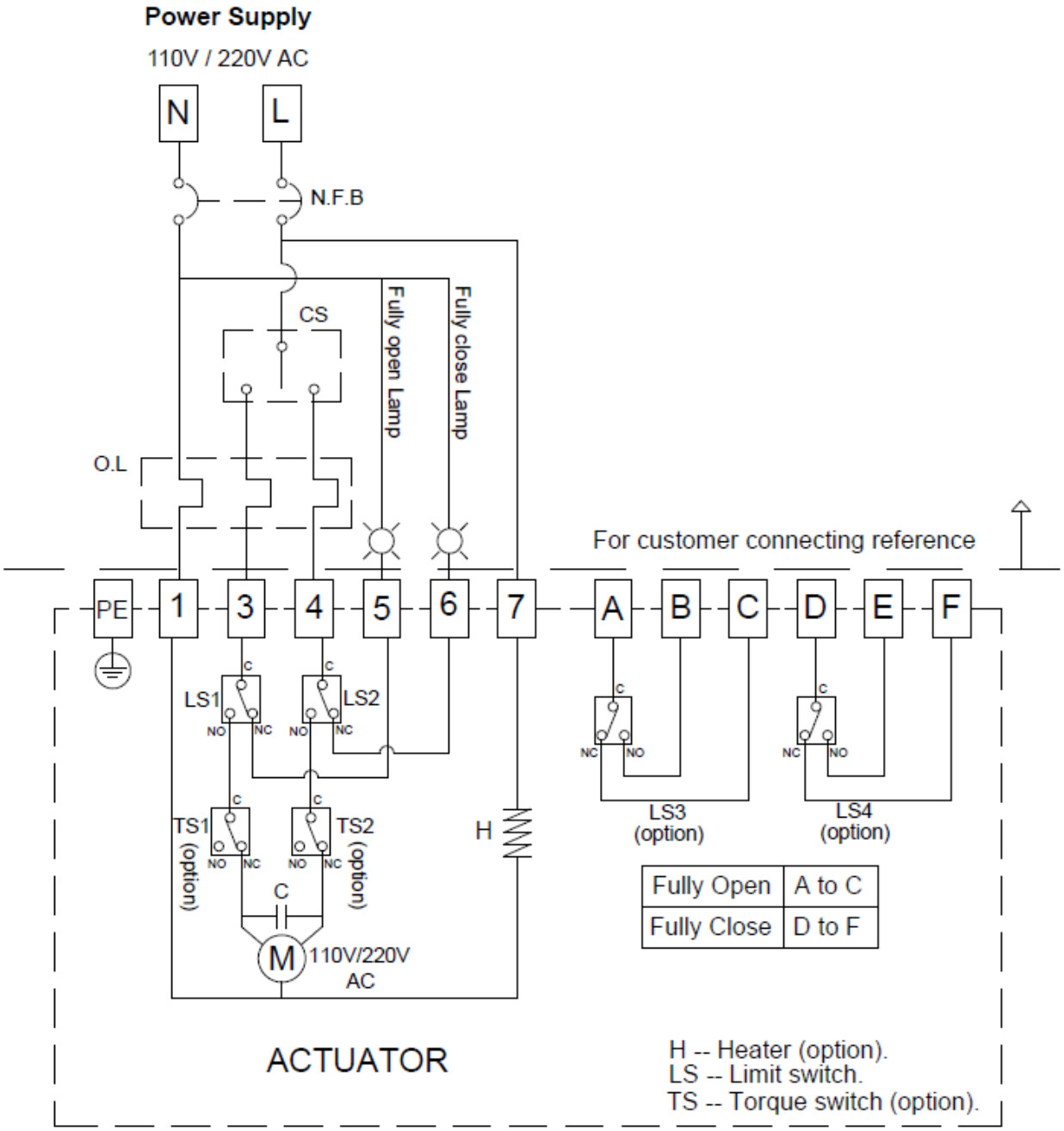
➢ SEA 8-PP - SEA 132-PP : 12V / 24V DC-75% Duty Cycle Modulating Controller



NOTE:

1. **Modulating Board**
   a. Input Signal：4~20mA, 1~5V, 2~10V
   (It is suggested to use the shielding wire and its length should not exceed 30m.)
   b. Output Signal：4~20mA, 2~10V
2. Using less than 5A current for “A, B, C, D, E, F”.
3. Using battery to supply power for DC units.

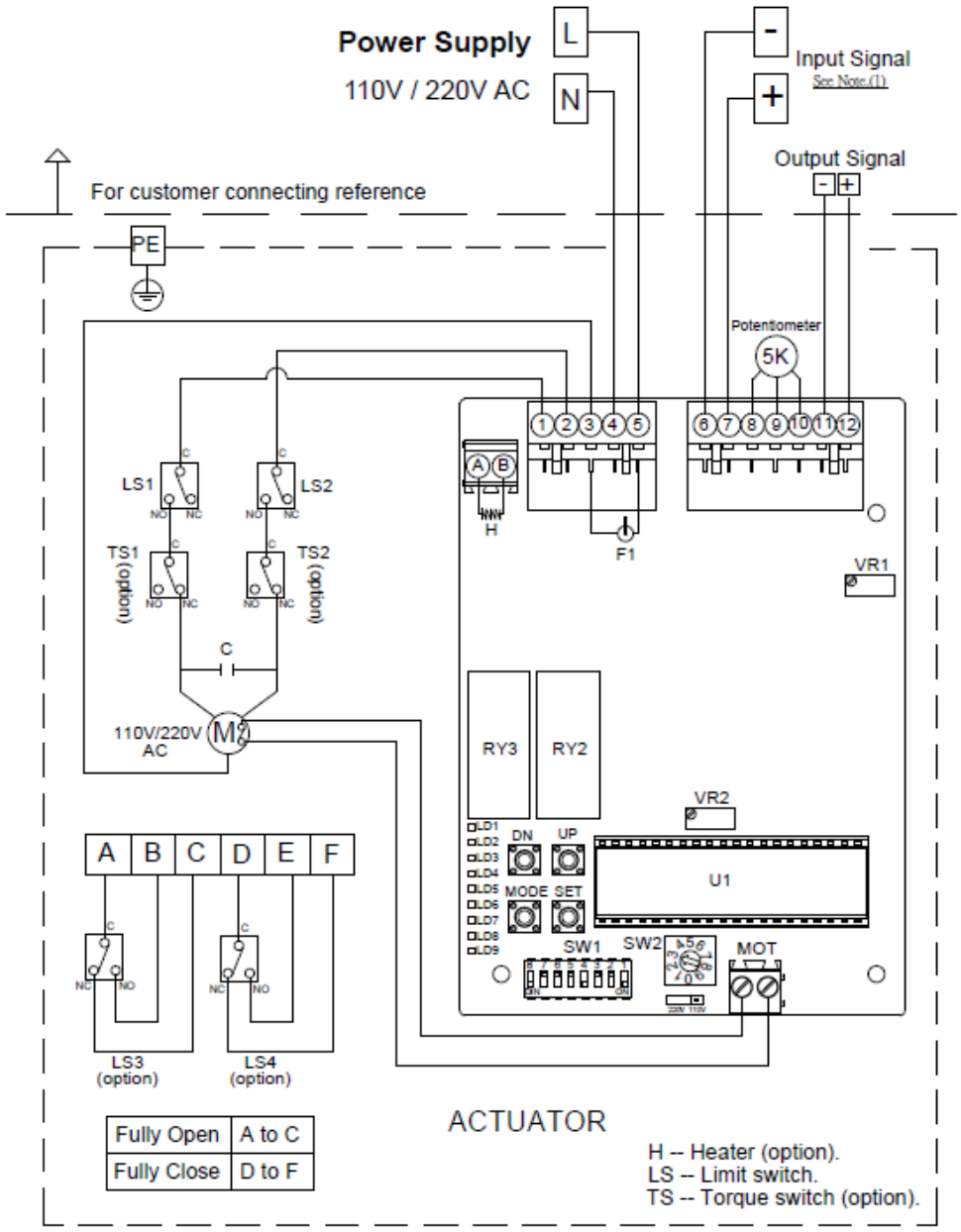
➢ SEA 8 – SEA 132: 110V / 220V AC – 30% Duty Cycle



NOTE :

1. "N" connects to #1, "L" connects to #7.
2. "L" connects to #3 for "OPEN", "L" connects to #4 for "CLOSE".
3. Using less than 5A current for "A, B, C, D, E, F".

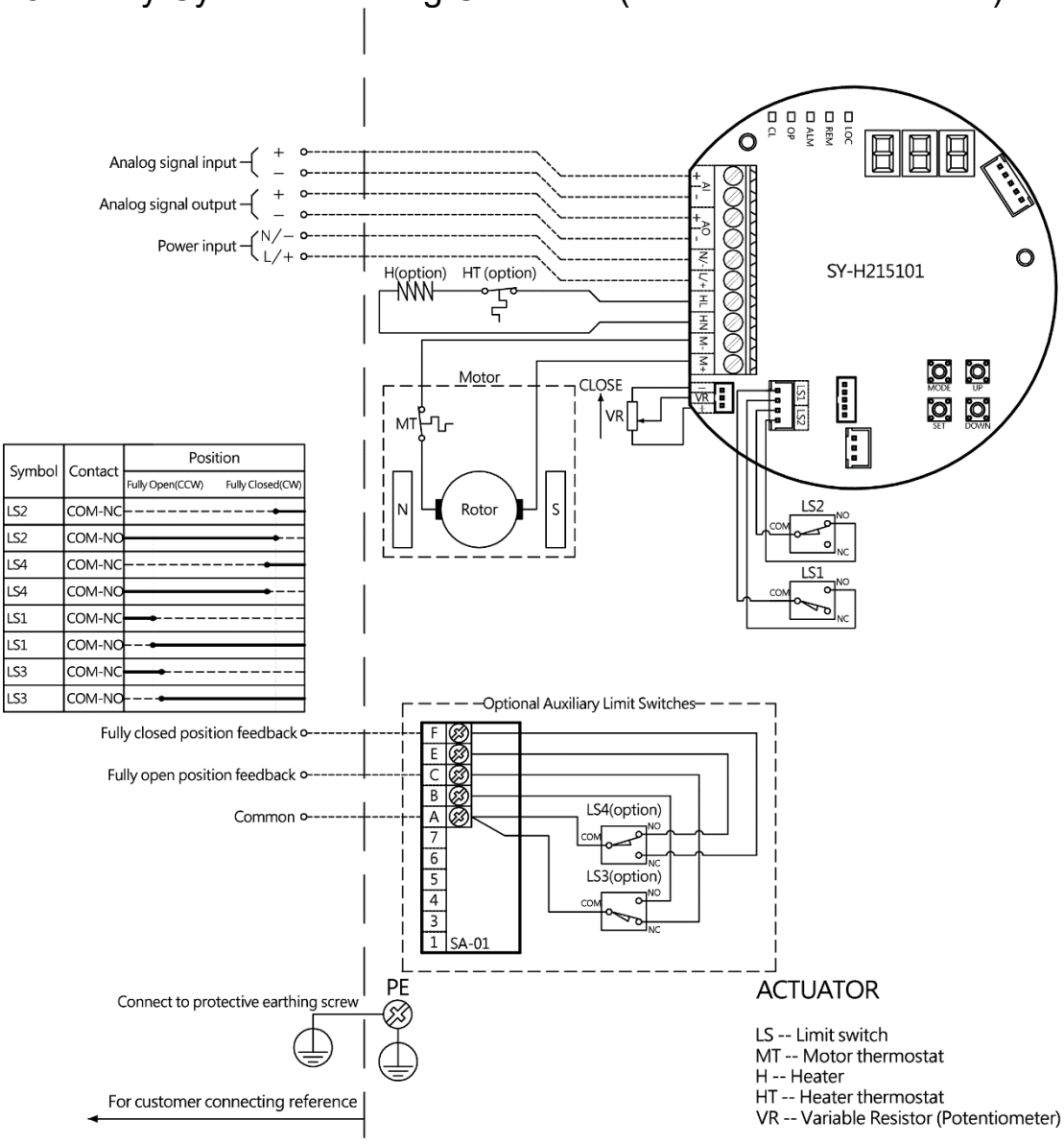
➢ SEA 8-PP – SEA 132-PP: 110V / 220V AC–75% Duty Cycle Modulating Controller



NOTE:

1. **Modulating Board**
   a. Input Signal：4~20mA, 1~5V, 2~10V
   (It is suggested to use the shielding wire and its length should not exceed 30m.)
   b. Output Signal：4~20mA, 2~10V
2. Using less than 5A current for “A, B, C, D, E, F”.

➢ SEA-3-PP & SEA-4-PP: 24V DC/ 110~120V/ 220~240V (Single Phase) – 75% Duty Cycle Modulating Controller (New Modulation Board)

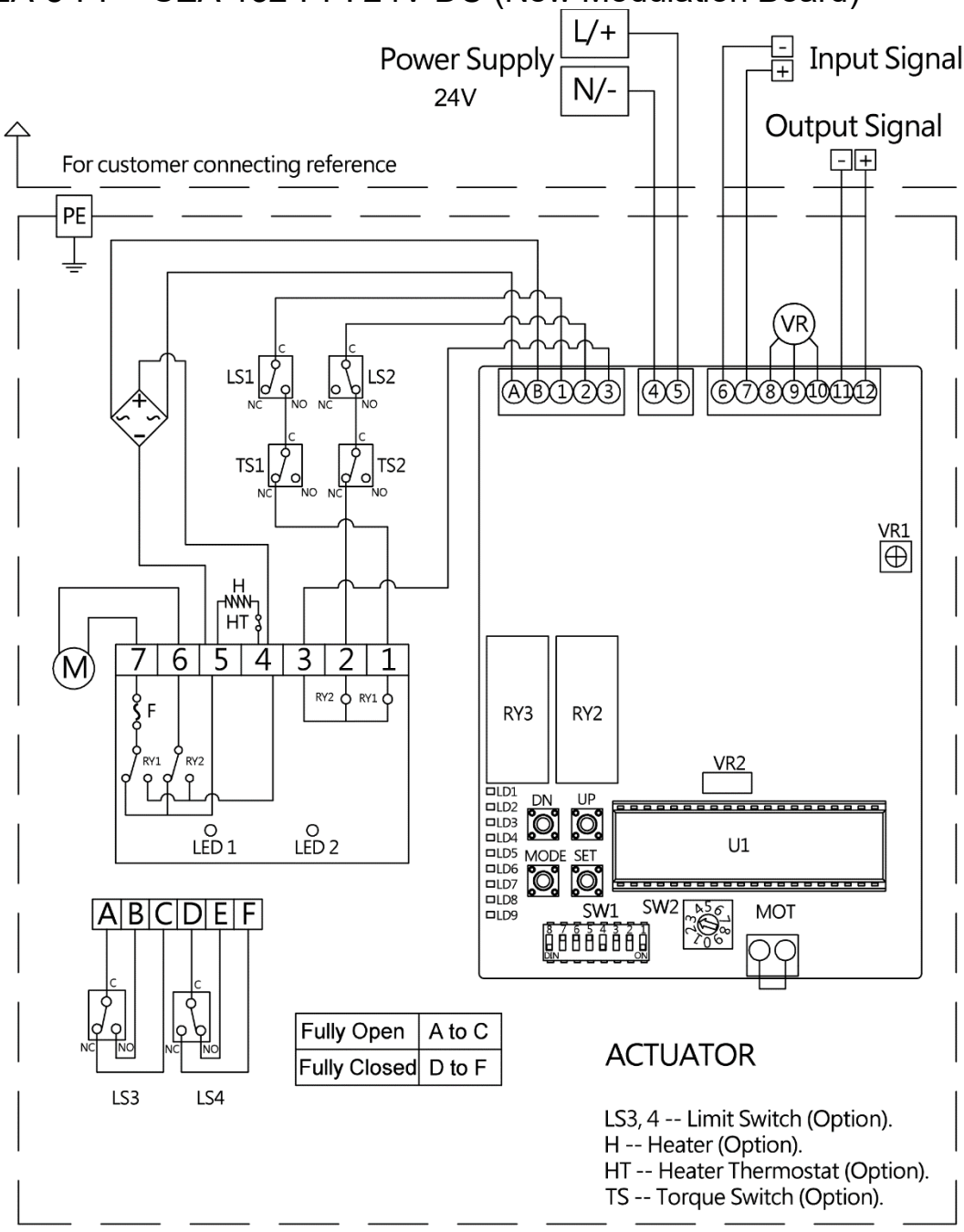


Symbol	Contact	Position: Fully Open(CCW)	Position: Fully Closed(CW)
LS2	COM-NC		●
LS2	COM-NO	●	
LS4	COM-NC		●
LS4	COM-NO	●	
LS1	COM-NC		●
LS1	COM-NO	●	
LS3	COM-NC		●
LS3	COM-NO	●	

NOTE:

1. Please input the rated voltage according to the actuator label.
2. Please note that you can only choose one type of input, either AC voltage or DC voltage.
3. The power supply's neutral (N) or DC negative (-) is connected to terminal (N/-), and the live (L) or DC positive (+) is connected to terminal (L/+).
4. Modulating Board
   a. Input Signal: 4~20mA, 1~5V, 2~10V **(It is suggested to use shielding wire and it's length should not exceed 30m.)**
   b. Output Signal: 4~20mA, 2~10V
5. The terminal Block (A~F) needs to use resistive load and should not exceed 3A at 250V
6. Actuator by default is in the fully open position.

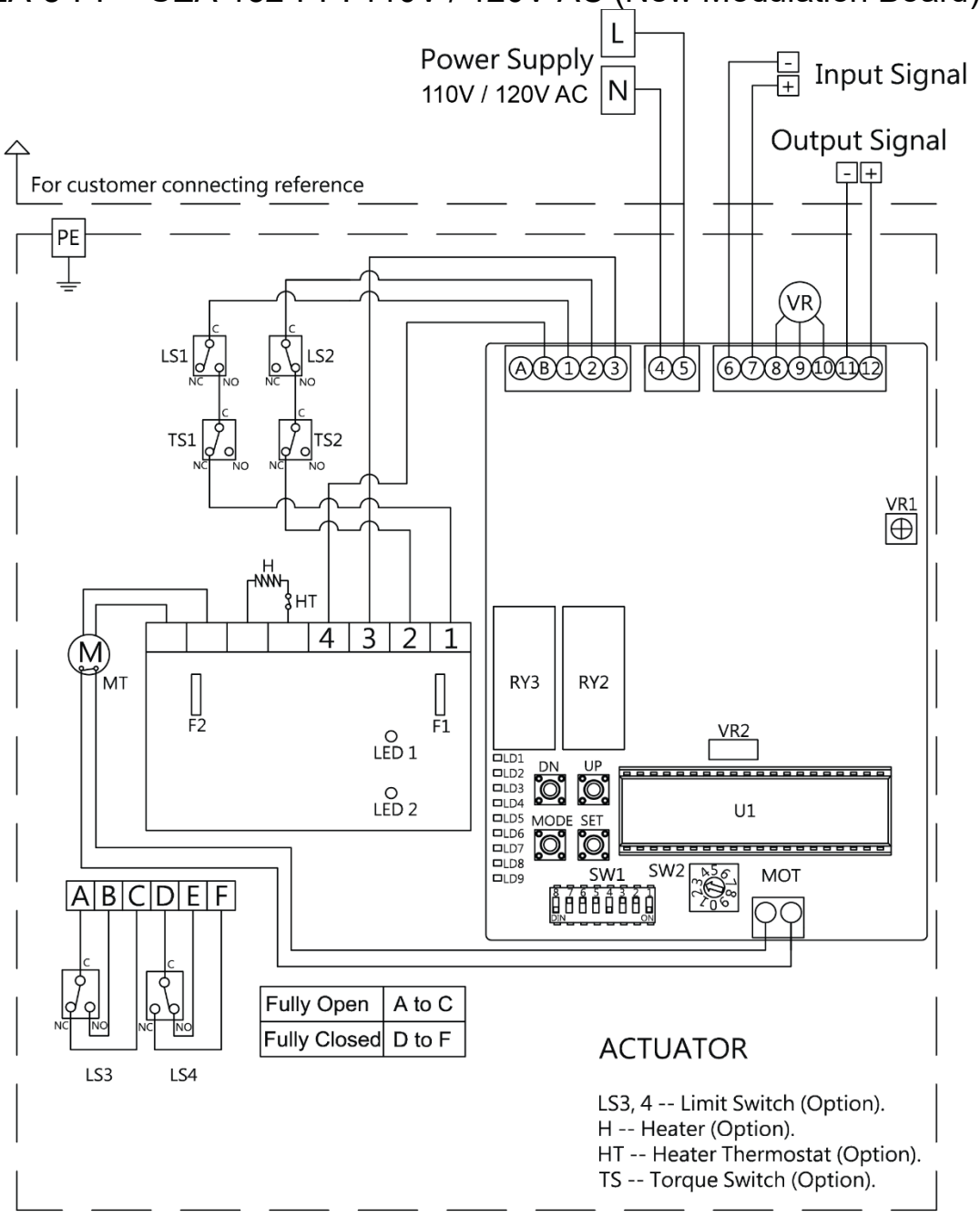
➢ SEA-8-PP - SEA-132-PP: 24V DC (New Modulation Board)



NOTE:

1. **Modulating Board**
   a. Input Signal: 4-20mA, 1-5V, 2-10V **(It is suggested to use shielding wire and it's length should not exceed 30m.)**
   b. Output Signal: 4~20mA, 2~10V
2. Using less than 5A current for "A,B,C,D,E,F"
3. Using Battery to supply power for DC units.

➢ SEA-8-PP - SEA-132-PP: 110V / 120V AC (New Modulation Board)



NOTE:

1. Modulating Board
   a. Input Signal: 4~20mA, 1~5V, 2~10V **(It is suggested to use shielding wire and it's length should not exceed 30m.)**
   b. Output Signal: 4~20mA, 2~10V
2. Using less than 5A current for "A,B,C,D,E,F"

LAMP SIGNALS (Previous Modulating Board)

LD1	Fully-closed	LD6	Motor thermostat turn off
LD2	Fully-open	LD7	Output signal short circuit
LD3	Power	LD8	Motor current is excessive
LD4	Abnormal Voltage	LD9	Manual Mode
LD5	Wrong input signal		

If the LED (LD4~LD9) is flashing under modulating control, refer to the following "Modulating Board Troubleshooting".

Lamp	Possibilities	Solution
No Lamp (LD3 off)	a. No power supply. b. The voltage is over 260V to causing the board to burn out. c. Wrong connecting for the #8, #9 of the VR. d. Faulty Modulating board.	a. Check the power supply and wiring b. Check the voltage. c. Check the wiring. d. Send back to factory for inspection.
LD5	a. Setting in 2-10V input signal but supply 4-20mA. b. Setting in 2-10V input signal, but the input signal is over 13.5V. ***Setting in 4-20mA but supply 2-10V signal. The actuator could still be operated within 2~7V. But if the signal is over 7.2V the LED5 will come ON.***	Confirm if the input signal is the same as dip switch setting (refer to P8~P9).
LD 6	Motor thermostat turns off.	a. Too high frequency for rated duty cycle(refer to P2). b. Motor thermostat (MOT) is not connected.
LD7	a. Output signal short circuit. b. Wrong connecting of the 2-10V input signal.	a. Confirm the wiring of output signal. b. Confirm the input signal
LD8	Motor current is excessive.	a. Too high frequency for rated duty cycle (refer to P2). b. Check the load (refer to P4). c. Check if the motor rotor is locked (For example: Valve is stuck by foreign objects).
LD9	Manual Mode - Setting position for open & close.	After completing the settings, press “SET” once.

TROUBLE SHOOTING

➢ On-Off controller:

Troubleshooting

Motor can not operate or overheats.

Possible problems	Solution
a. The limit switch for fully-closed does not trip.	a. Operate the actuator manually to fully-closed position and confirm if the limit switch trips.
b. Motor shaft or bearing were stuck.	b. Switch to manual operation mode and power on to see if the motor could not drive the gears, it means that the motor shaft or bearing is stuck and the motor needs to be replaced.
c. Power applied to terminals #3 and #4 simultaneously (Abnormal Wiring).	c. Follow the wiring diagram inside the cover to connect wires and make sure the wiring is correct.
d. Jammed pipe or stuck valve seat.	d. Check if any blockage or obstacle in pipe and remove.
e. The seating torque of valve increased due to oxidized seals and has resulted in a torque overload on actuator.	e. Manual operate to check if it can be operated, if not, replace the valve.

The actuator operates but the motor is hot.

Possible problems	Solution
a. The mechanical stop screws ran into the output drive gearing.	a. Reset the mechanical end stops and travel cams, please refer to (Pg.5 - Pg.7)
b. A torque overload caused by the valve.	b. This situation occurs frequently after the valve has been operating for a period of time. It is suggested to replace with a new valve.
c. Wrong power supply.	c. Check the power supply.
d. Actuator operates too frequently and exceeded duty cycle rating.	d. Adjust the system bandwidth or reduce the frequency of operation, please refer to (Pg.2).

To control two or more actuators, sometimes the actuator works abnormally and the motor is getting hot.

Possible problems	Solution
Parallel connection.	a. Install Isolating Relay Module (Optional). b. Please contact your distributor to acquire the wiring diagram for parallel connection.

TROUBLE SHOOTING (cont.)

The valve cannot operate either electrical operation or manual operation.

Possible problems	Solution
a. The actuator was mounted to the valve improperly. b. The set screw of the cam loosened and resulted in that the travel end positions misaligned. c. The torque of valve is larger than the torque of actuator. d. The actuator was mounted to the valve improperly.	a. Please refer to (Pg.3) valve installation instructions. b. Readjust the mechanical end stops and limit switches, please refer to (Pg.5- Pg.7) c. Replace with a new valve or a larger size actuator. d. Disassemble the actuator from the valve and reassemble them to verify that they are installed properly.

None of the LED indicators on the PCBA lit up after power is supplied.

Possible problems	Solution
a. Blown fuse.	a. Replace a new fuse.
b. PCBA failed.	b. Replace a new PCBA.
c. Wrong supply voltage.	c. Check the power supply.

The capacitor is faulty.

Possible problems	Solution
The ambient temperature is too high or too low.	The actuator should be installed within the rated ambient temperature range of -30 °C to +65 °C (-22 °F to + 149 °F).

TROUBLE SHOOTING (cont.)

➢ Modulating controller (Previous Modulation Board):

1. The LED (LD5~LD9) is flashing after the operating check is completed.

Solution
Refer to p.24

2. The lamps on the modulating board are normal but the actuator can't work properly during test or it only can turn to fully open/closed position.

Possibilities	Solution
The signal is connected opposite (means to signal failure).	Confirm if the input signal and the wiring are correct

3. Can not operate by modulating controller.

Possibilities	Solution
a. Faulty VR.	a. Replace the actuator
b. The sector gear of the VR is loose.	b. Remove the input signal wires. Operate the actuator to fully-closed. Then readjust the VR
c. Wrong input signal.	c. Check if the input signal is correct
d. Faulty modulating board.	d. Replace the actuator

- Modulating controller (New Modulation Board):

Modulating Control (SEA-8-PP - SEA-132-PP)

The LED indicators (LD4 - LD9) flash.

Solution
Please refer to (Pg.41- Pg.42).

The LED indicators on the modulating board are normal, but the actuator cannot operate or can only operate in either the fully-open or fully-closed position.

Possible problems	Solution
The input signal with a reversed polarity, it means a signal failure.	Verify if the negative pole of signal input connected to terminal #6 and the positive pole connected to terminal #7.

Modulating control is not functioning.

Possible problems	Solution
a. The modulating board is faulty, and the actuator cannot operate or can only operate in one direction.	a. Replace a new modulating board
b. Input wrong signal type.	b. Check if the input signal is correct, please refer to (Pg.36-Pg.38) or (Pg.44-Pg.47).
c. Modulating board failed and causes actuator cannot operate or only operate in a single direction	c. Replace a new modulating board.