

SEA Electric Actuator IOM

REVISION: 3
DATE: 4-2022

**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 principal, 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 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: $\text{Running Time} \div (\text{Running time} + \text{Rest Time}) \times 100\% = \text{duty cycle}$

$\text{Rest Time} = \text{Running Time} \times (1 - \text{duty cycle}) \div \text{duty cycle}$

For example : SEA 8

30% duty cycle $17 \times [(1 - 30\%) / 30\%] = 40$ → The rest time will be 40 sec.

75% duty cycle $19 \times [(1 - 75\%) / 75\%] = 6$ → 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 : $700 \times 1.3(\text{safety factor}) = 910 \text{ in/lbs.}$
 - $910 \text{ in/lbs.} < 1330 \text{ in/lbs.} = \text{SEA 13 is OK!}$
 - $910 \text{ in/lbs.} > 800 \text{ in/lbs.} = \text{SEA 8 is not OK!}$
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	PP	On & Off	PP	On & Off	On & Off	PP
						Running	Running	Running	
SEA 1	5W	132	18 / - / -	N/A	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	PP	On & Off	PP	On & Off
							Running	Running	Running	Running	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	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	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	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	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	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	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	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	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	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	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	3.8 / 3.9	4.5 / 4.8	2.5 / 2.0	2.5 / 2.6	1.3 / 1.5	

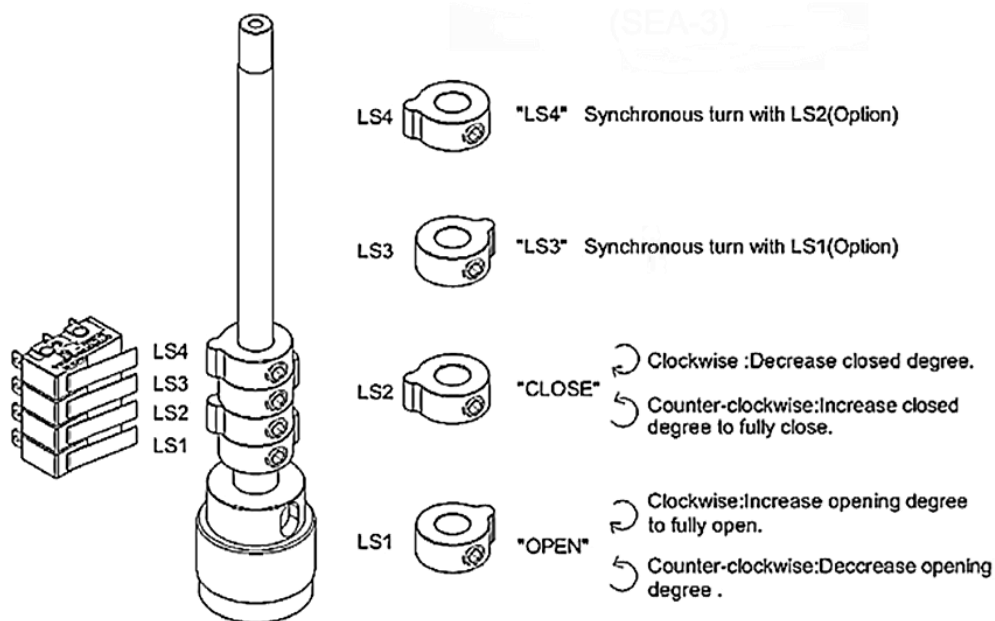
For other options not listed please contact Sharpe®

* 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

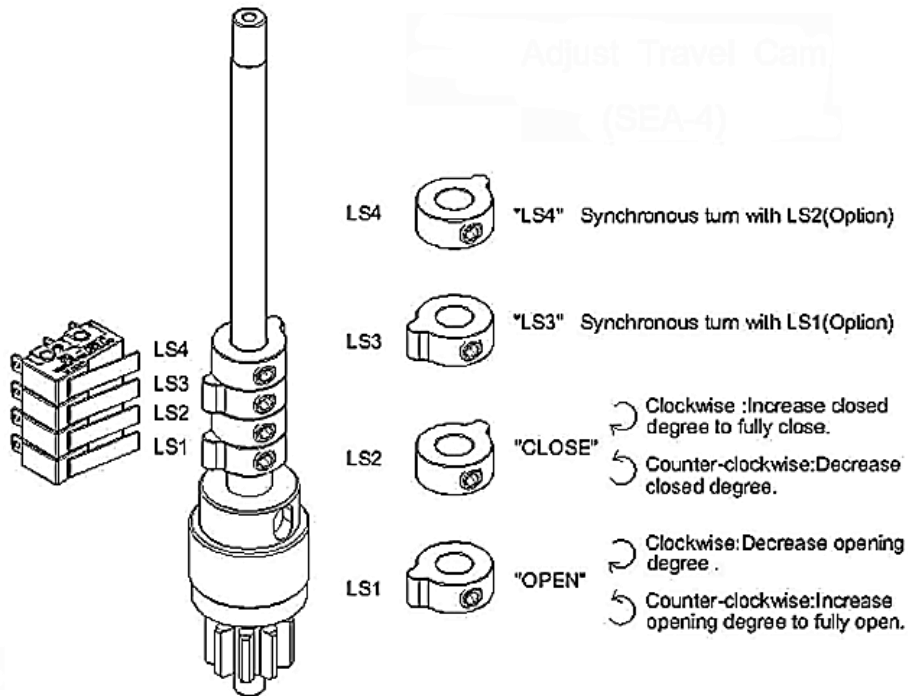
- The travel cams are set to control the open and closed position of the valve. LS1 & LS2 limit the maximum range by disabling the electric motor.
- LS3 & LS4 are optional. They allow external equipment to confirm that the valve has reached the fully open and fully closed positions.
 - **IMPORTANT:** 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

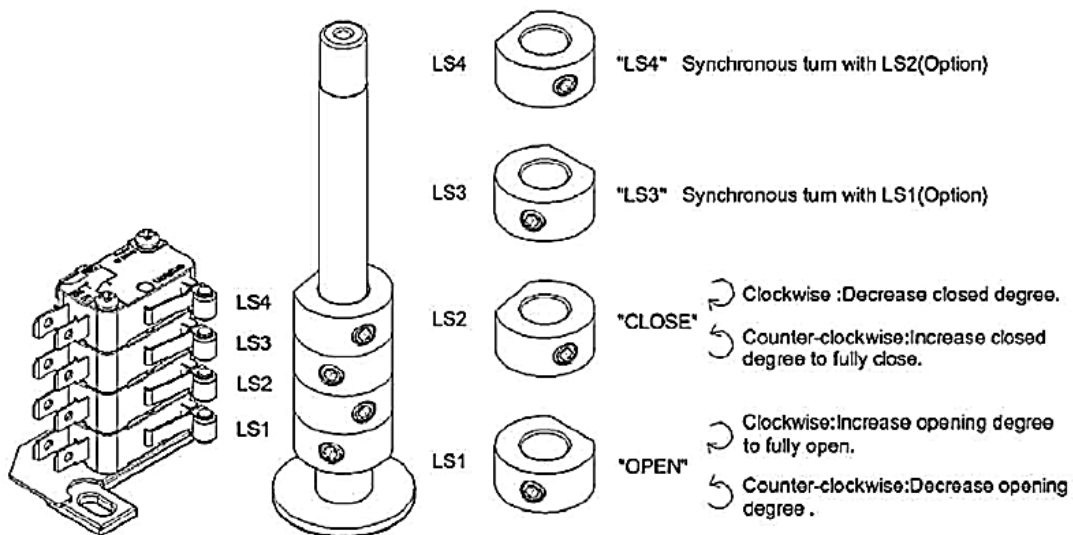


TRAVEL CAM & LIMIT SWITCHES ADJUSTMENT (cont.)

➤ Travel Cam Adjustment –SEA 4

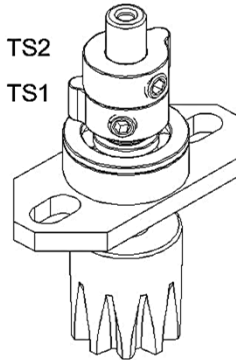
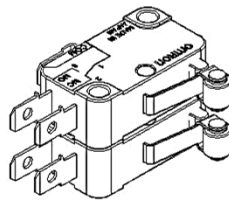


➤ Travel Cam Adjustment –SEA 8 - SEA310



TRAVEL CAM & TORQUE SWITCHES ADJUSTMENT

➤ Travel Cam Adjustment –SEA 8 - SEA310



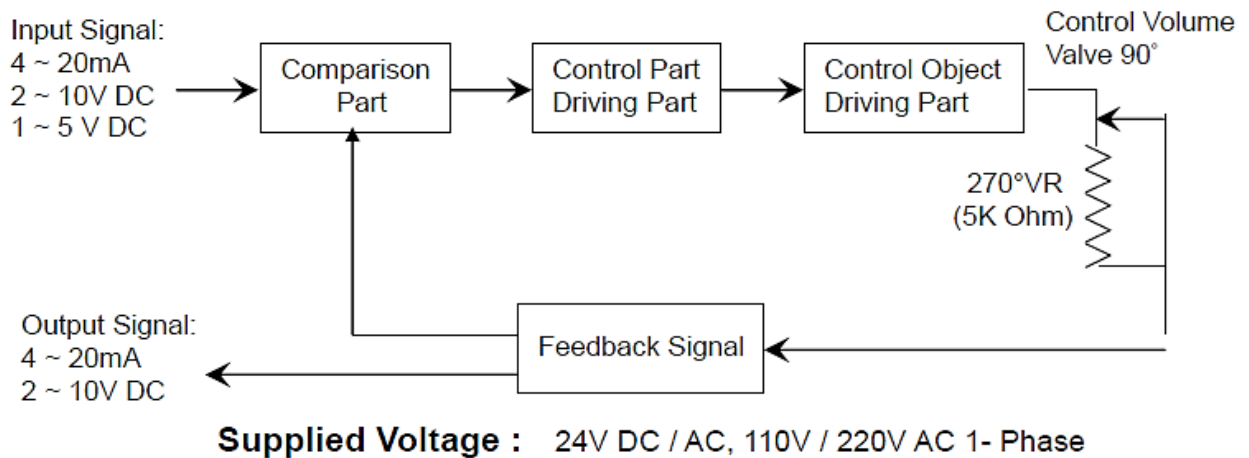
TS2
"CLOSE" ↶ Counter-clockwise: Decrease the degree of torque setting.

↷ Clockwise : Increase the degree of torque setting.

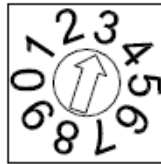
TS1
"OPEN" ↶ Counter-clockwise: Decrease the degree of torque setting.

↷ Clockwise : Increase the degree of torque setting.

MODULATING CONTROL BOARD PROCEDURE



SENSITIVITY SWITCH

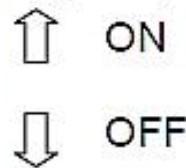


➤ Setting

- 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
4~20mA input	ON	OFF						
1~5V input	OFF	OFF						
2~10V input	OFF	ON						
4~20mA output			OFF	ON	OFF			
2~10V output			ON	OFF	ON			
20mA / 5V / 10V means valve fully-open						OFF		
20mA / 5V / 10V means valve fully-closed						ON		
Close valve if input signal disconnected (when S6 sets “ OFF”)							OFF	ON
Open valve if input signal disconnected (when S6 sets “ OFF”)							ON	OFF

DIP SWITCH SETTING (cont.)

- **S1 & S2:**
 - INPUT SIGNAL SELECT
 - 4~20mA 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
 - 4-20mA 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

- 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.

- 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
- 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.

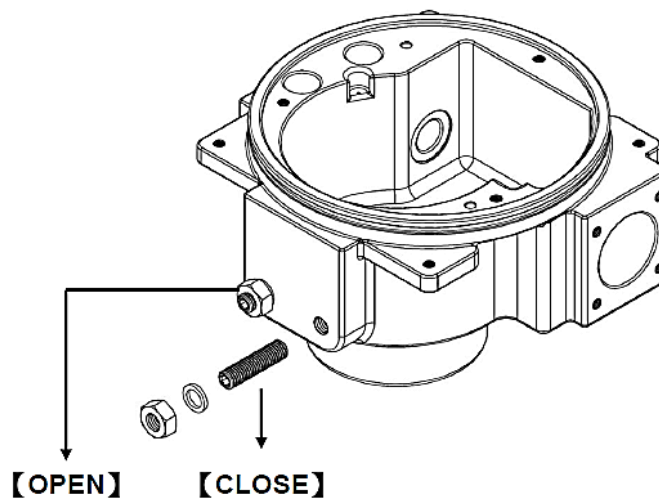
➤ For Electric Operation:

- 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.

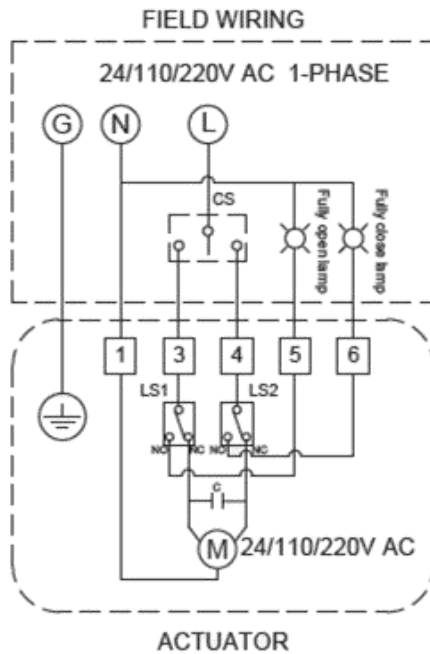
Failure to ensure the electrical limit switches are reached before the mechanical stops are hit, when operating in electric mode, can cause personal injury or damage to the actuator.



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.

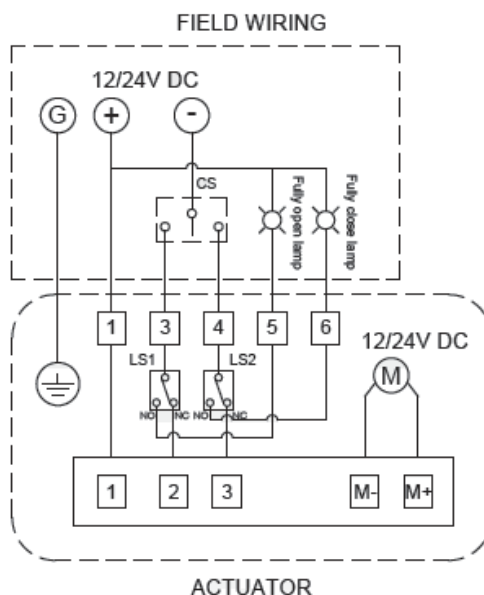
Wire Gage	Max Current	Fuse
24(0.205mm ²)	3A	2A

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.

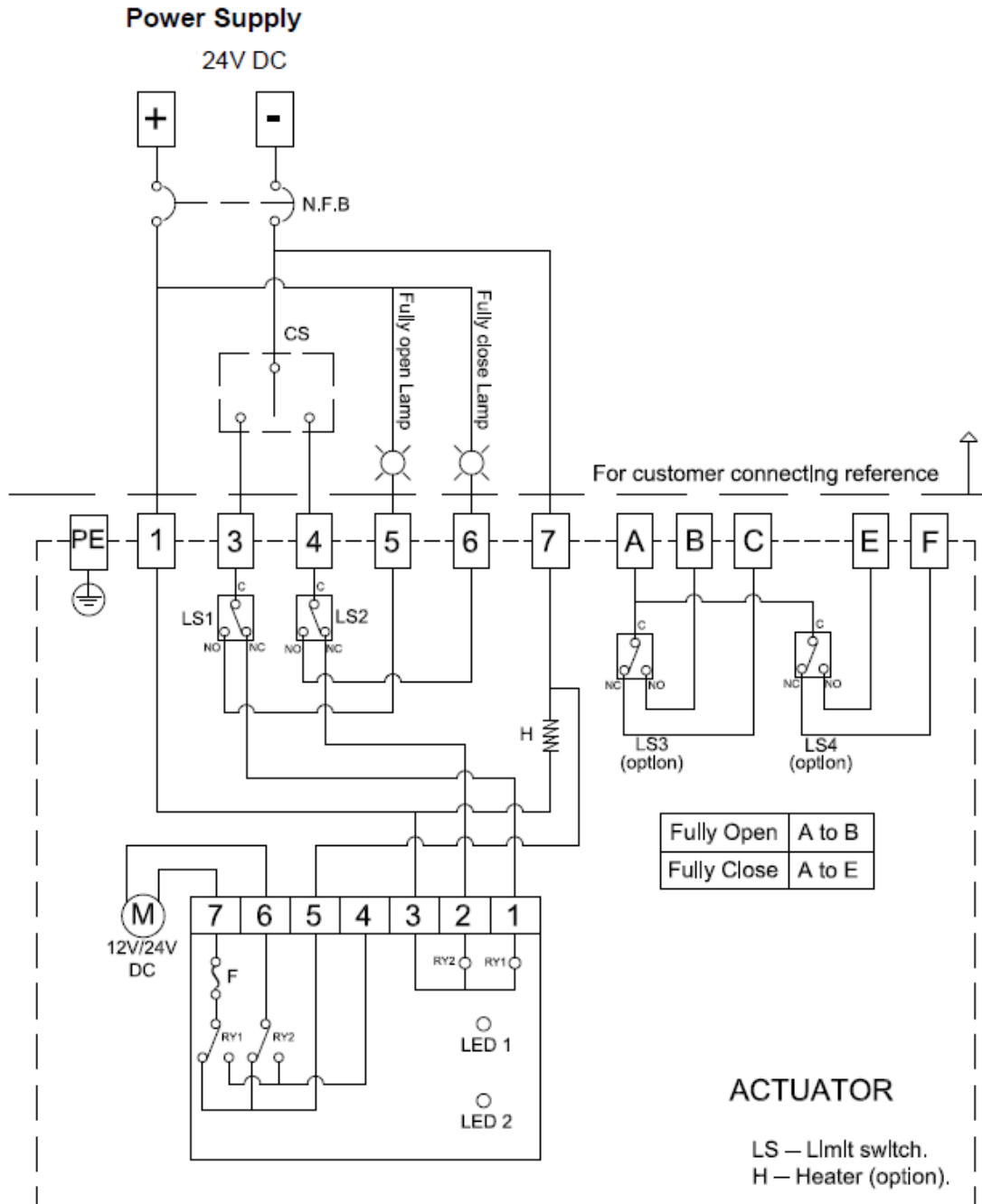
Wire Gage	Max Current	Fuse
24(0.205mm ²)	3A	2A

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.

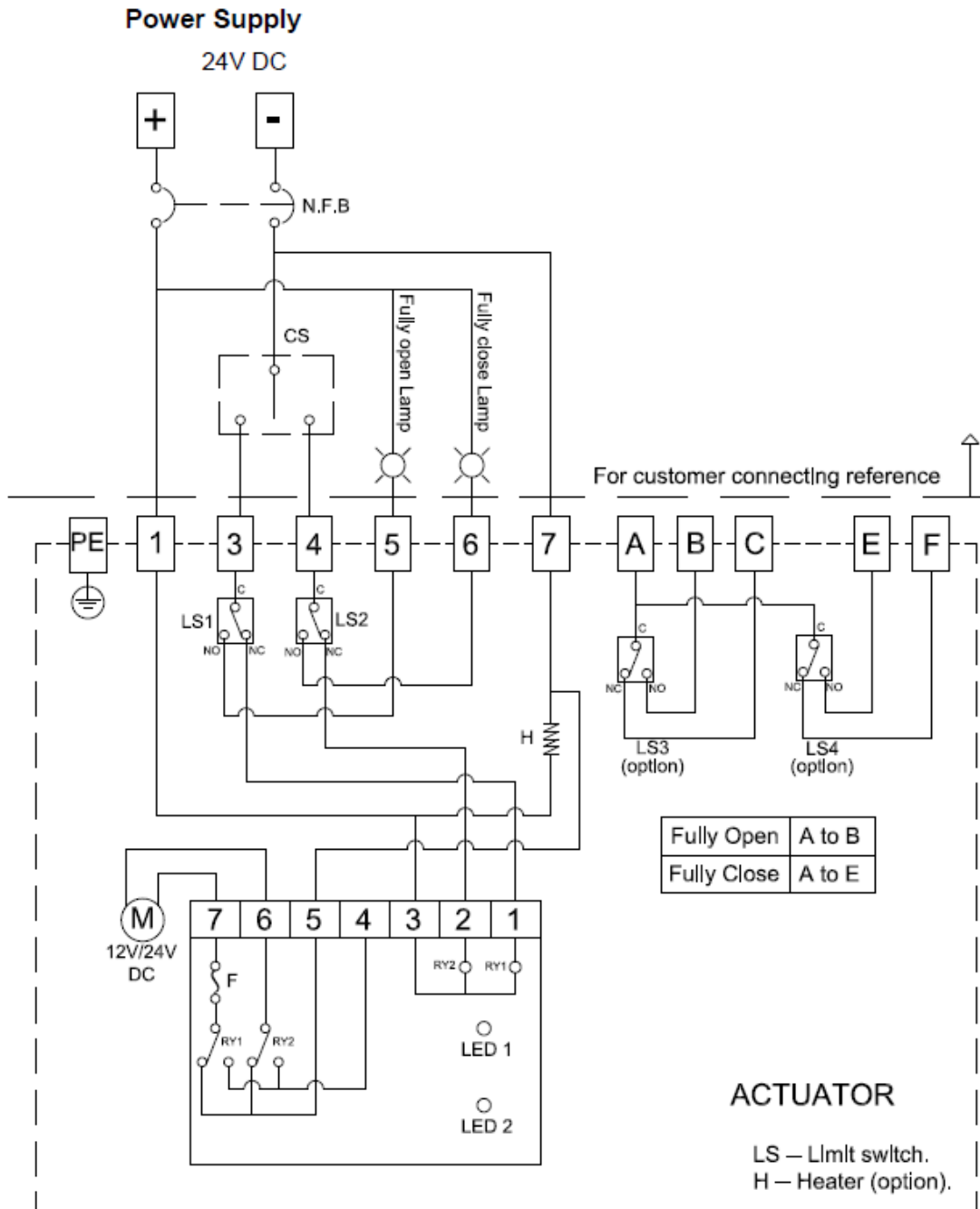
➤ SEA 3-4: 24V DC – 30% Duty Cycle



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.

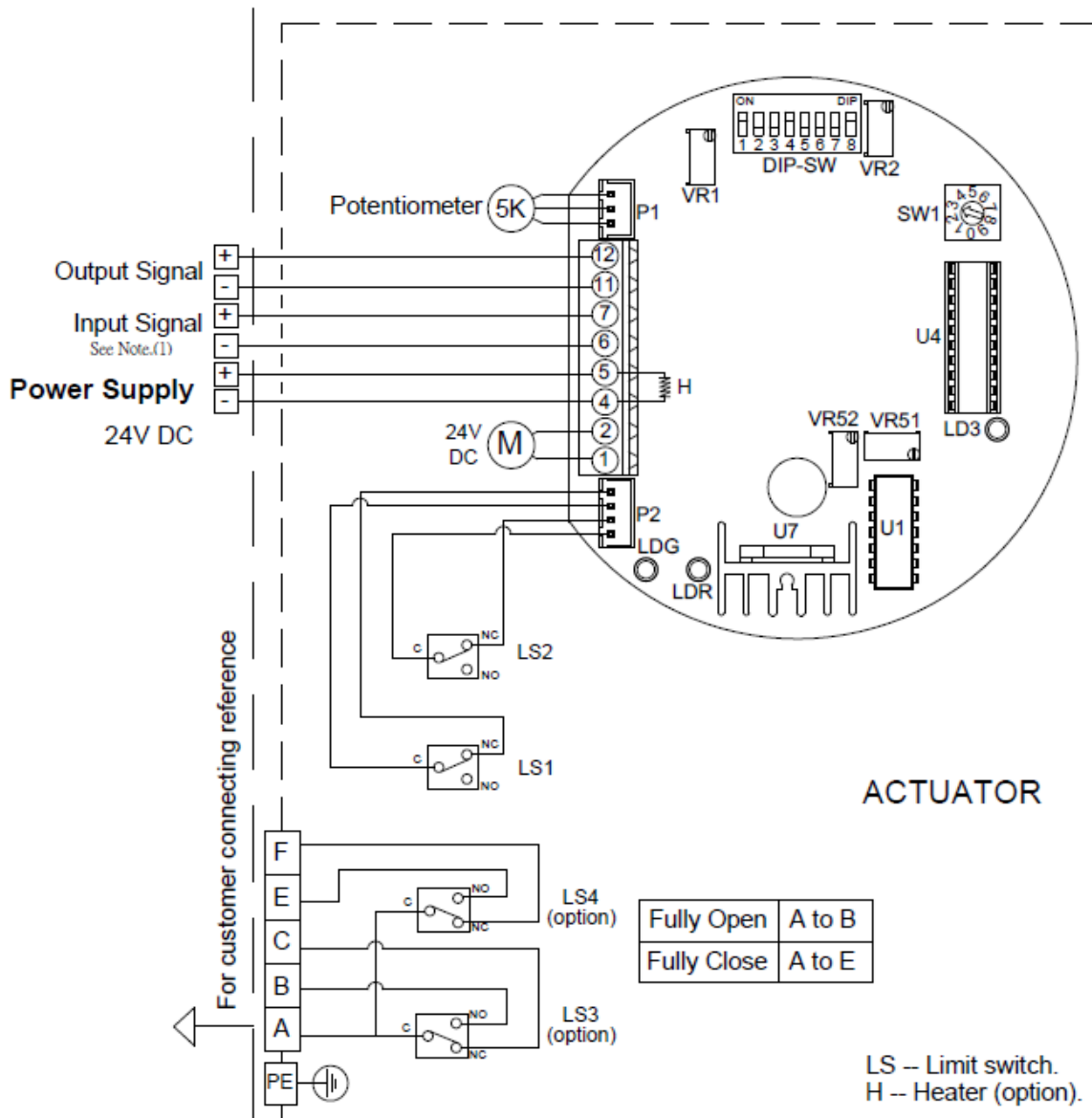
➤ SEA 4-4: 24V DC – 30% Duty Cycle



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

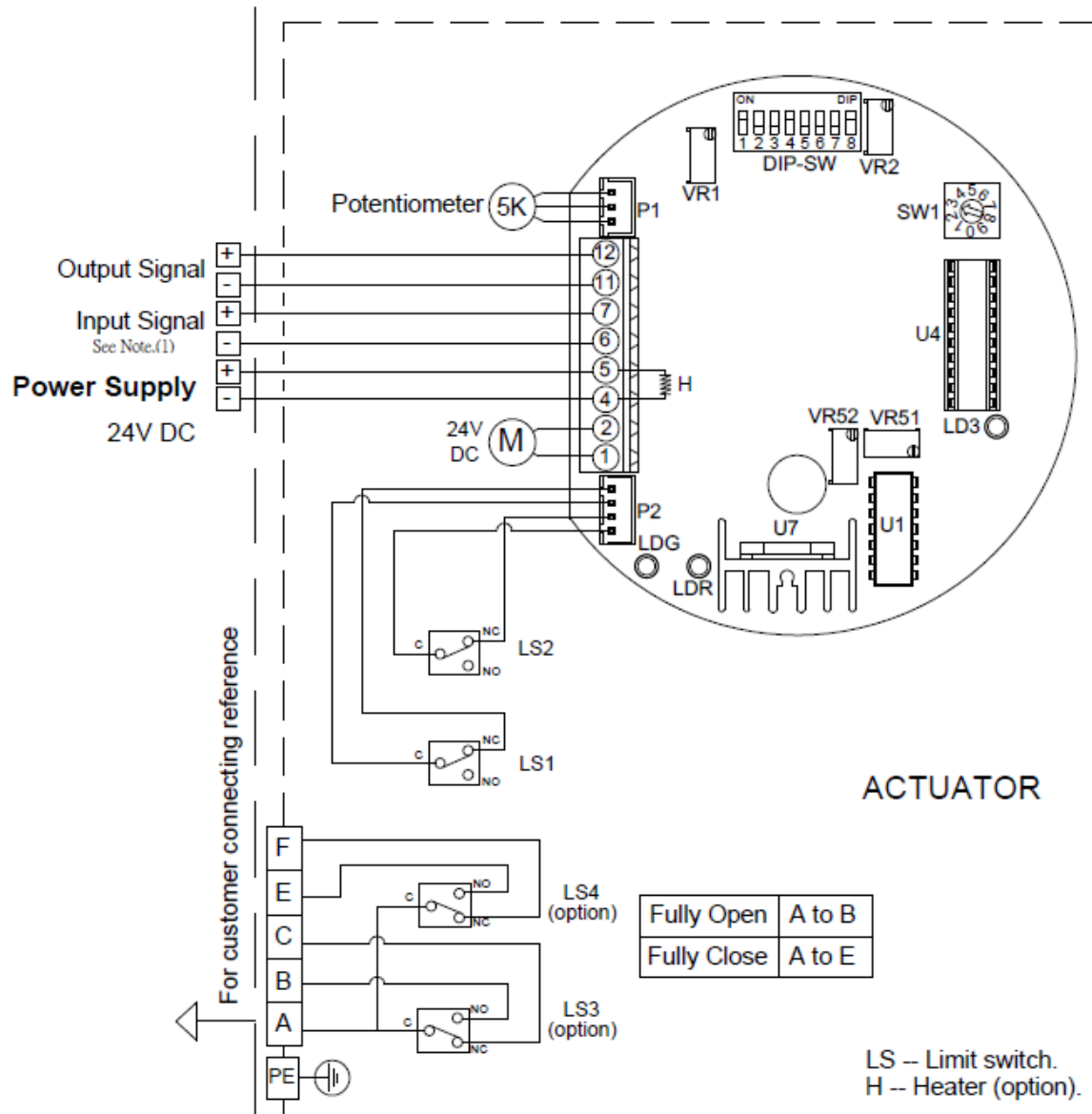


NOTE :

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

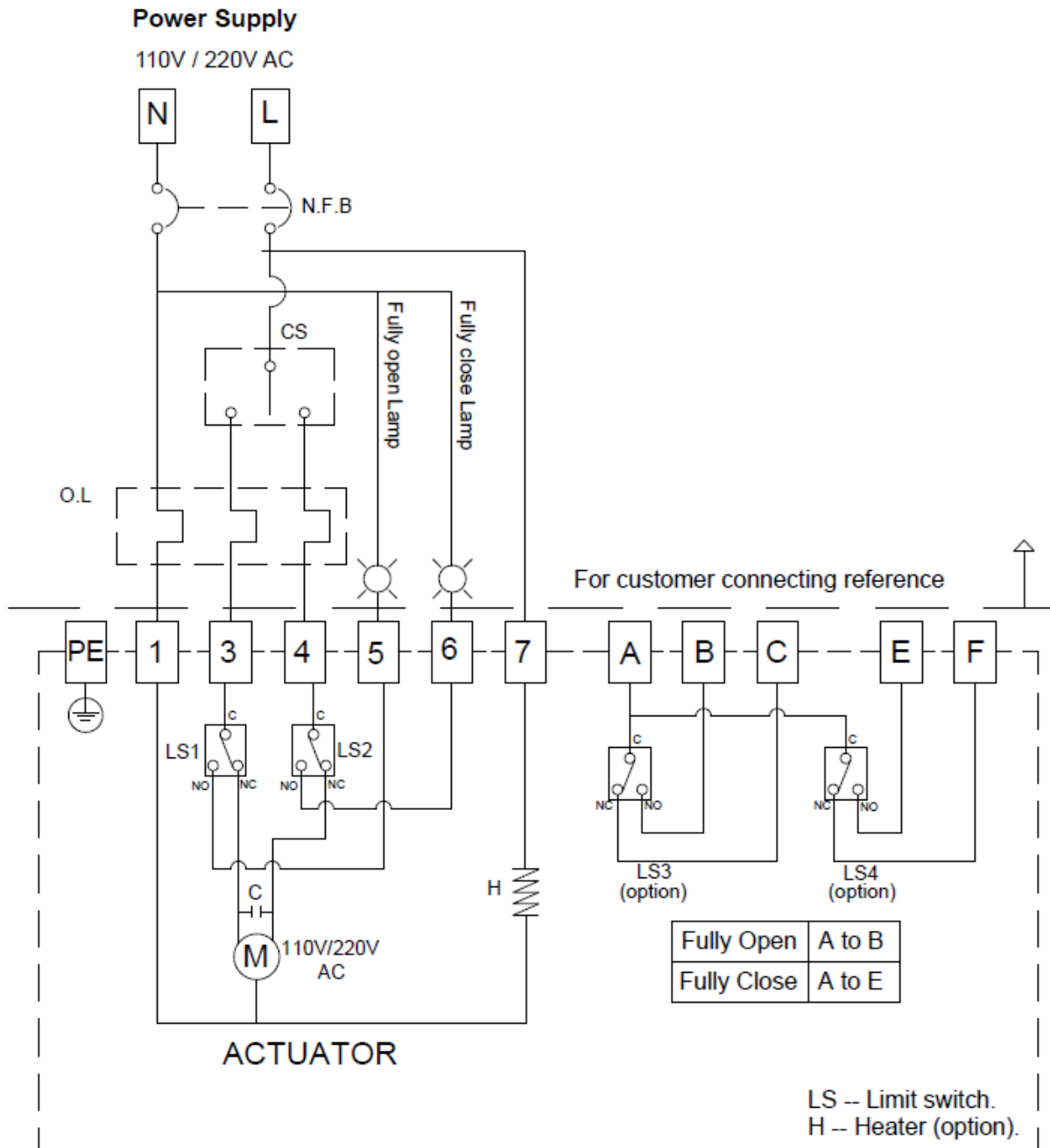
(It is suggested to use the shielding wire and its length should not exceed 30m.)

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.

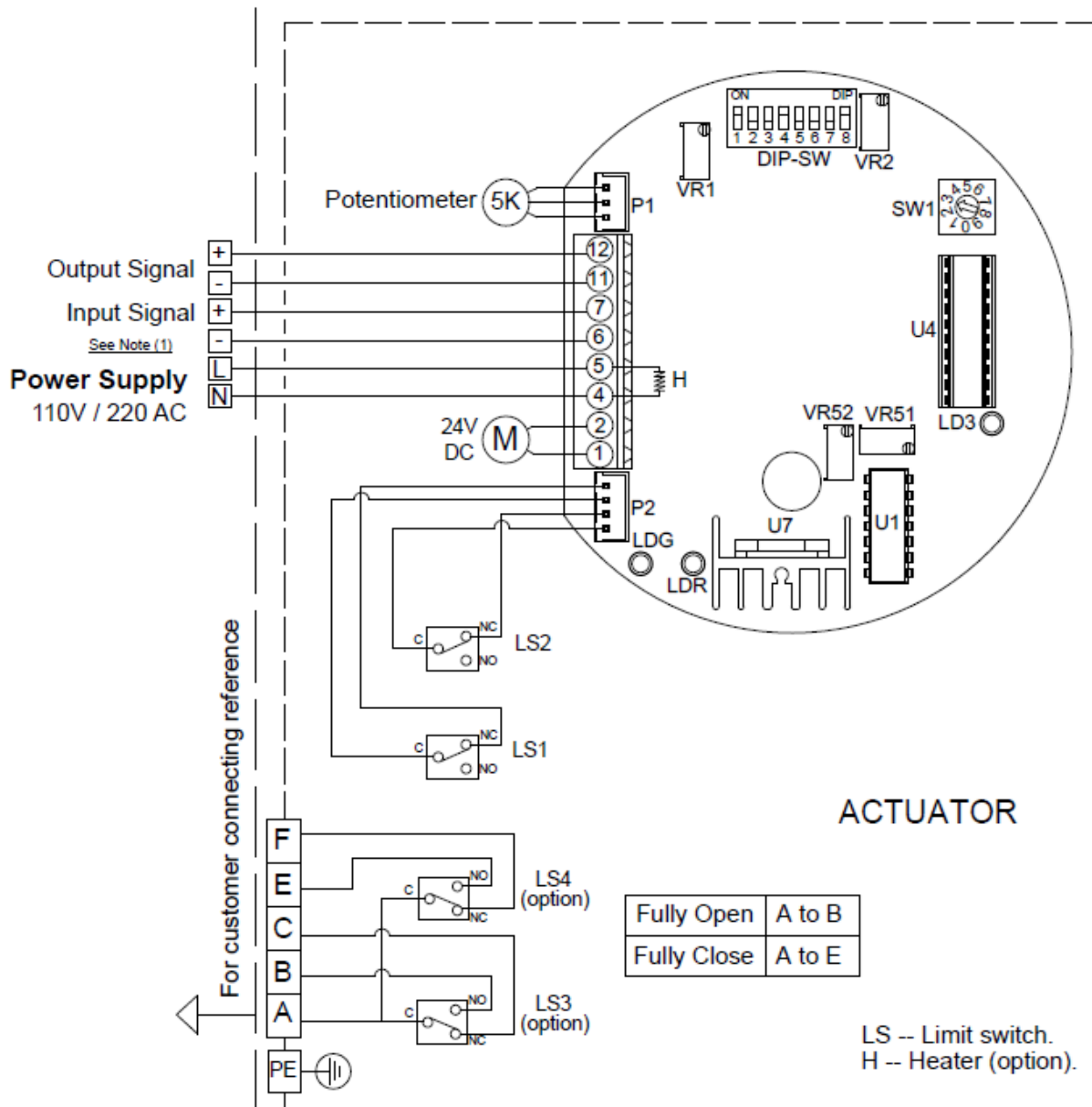
➤ SEA 3 & SEA 4: 110V / 220V AC – 30% Duty Cycle



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



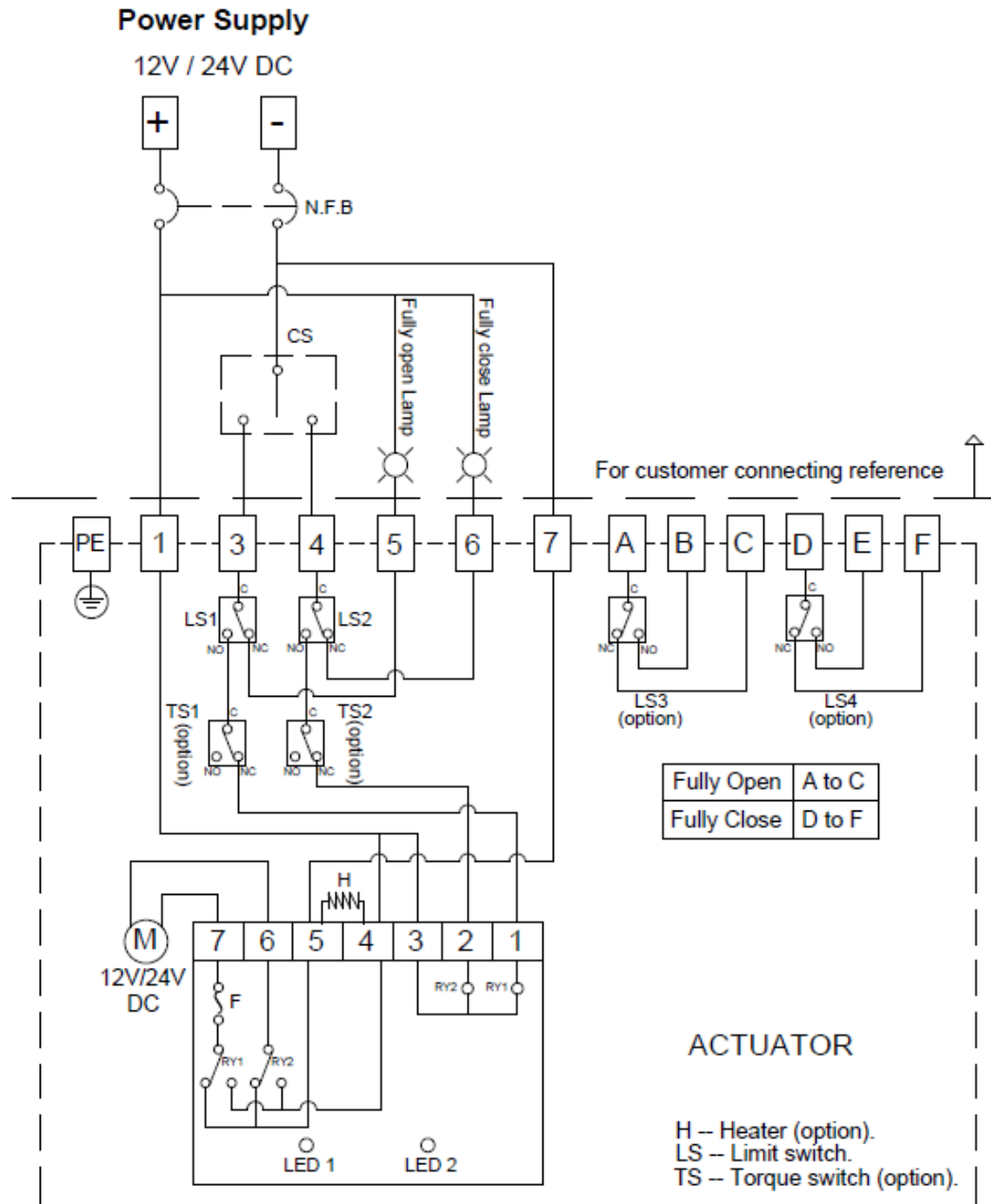
NOTE:

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".

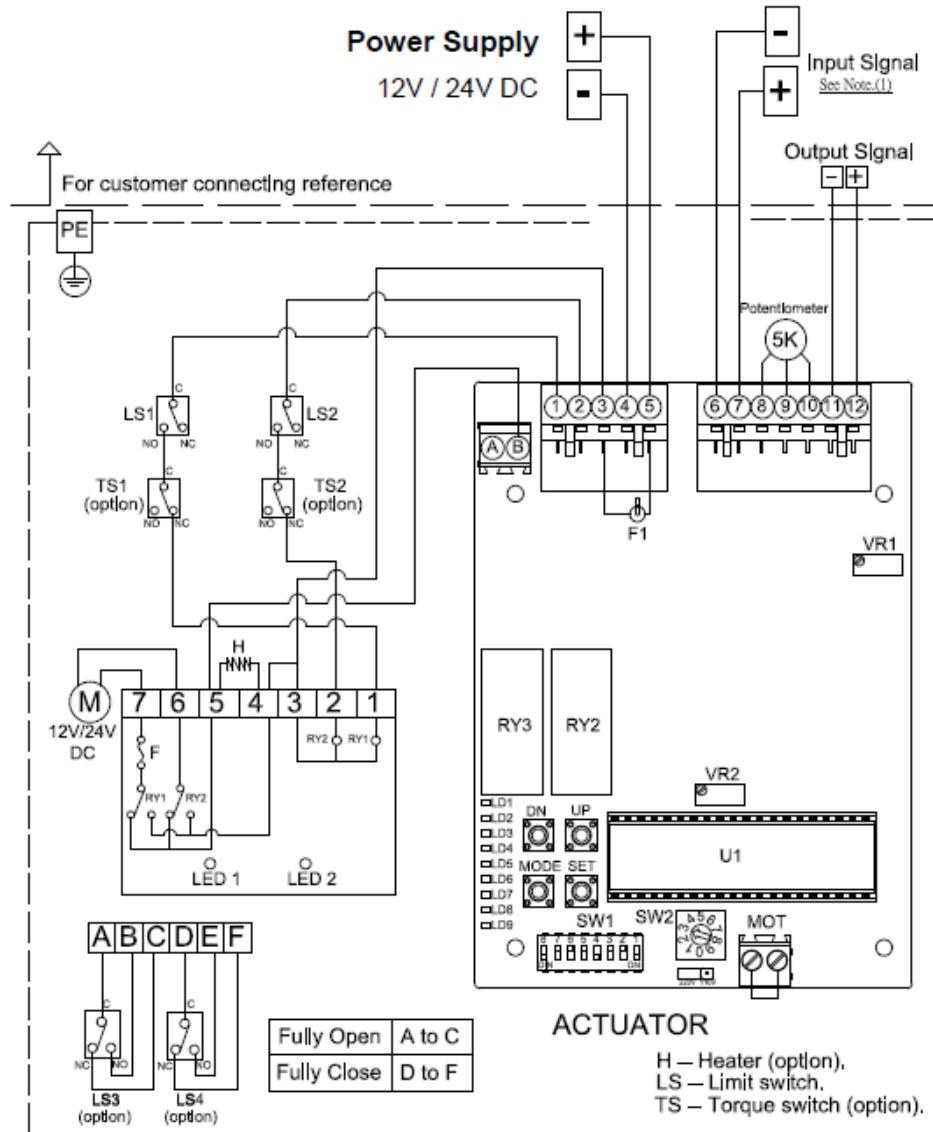
➤ SEA 8 – SEA 132: 12V / 24V DC – 30% Duty Cycle



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

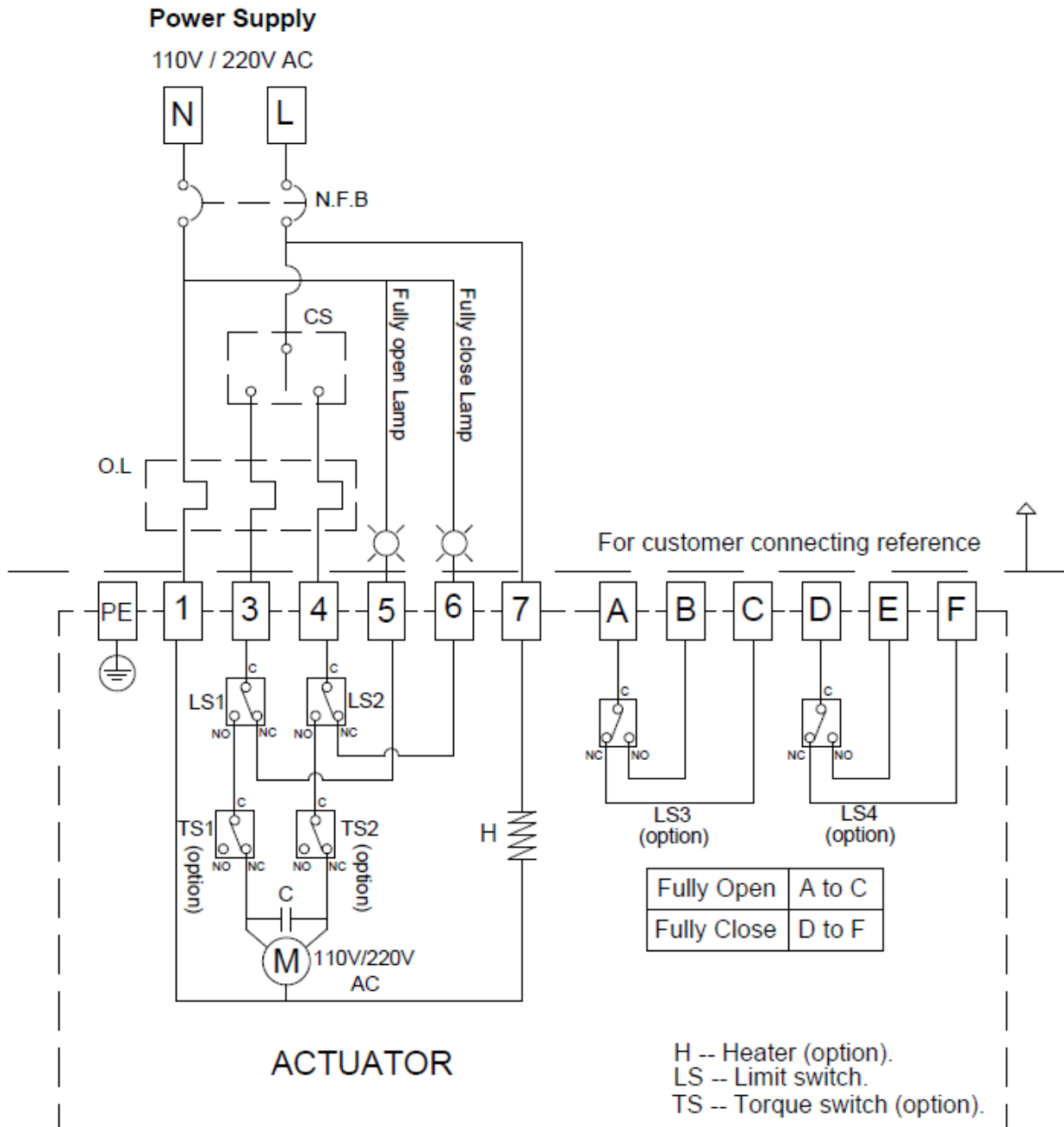
(It is suggested to use the shielding wire and its length should not exceed 30m.)

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

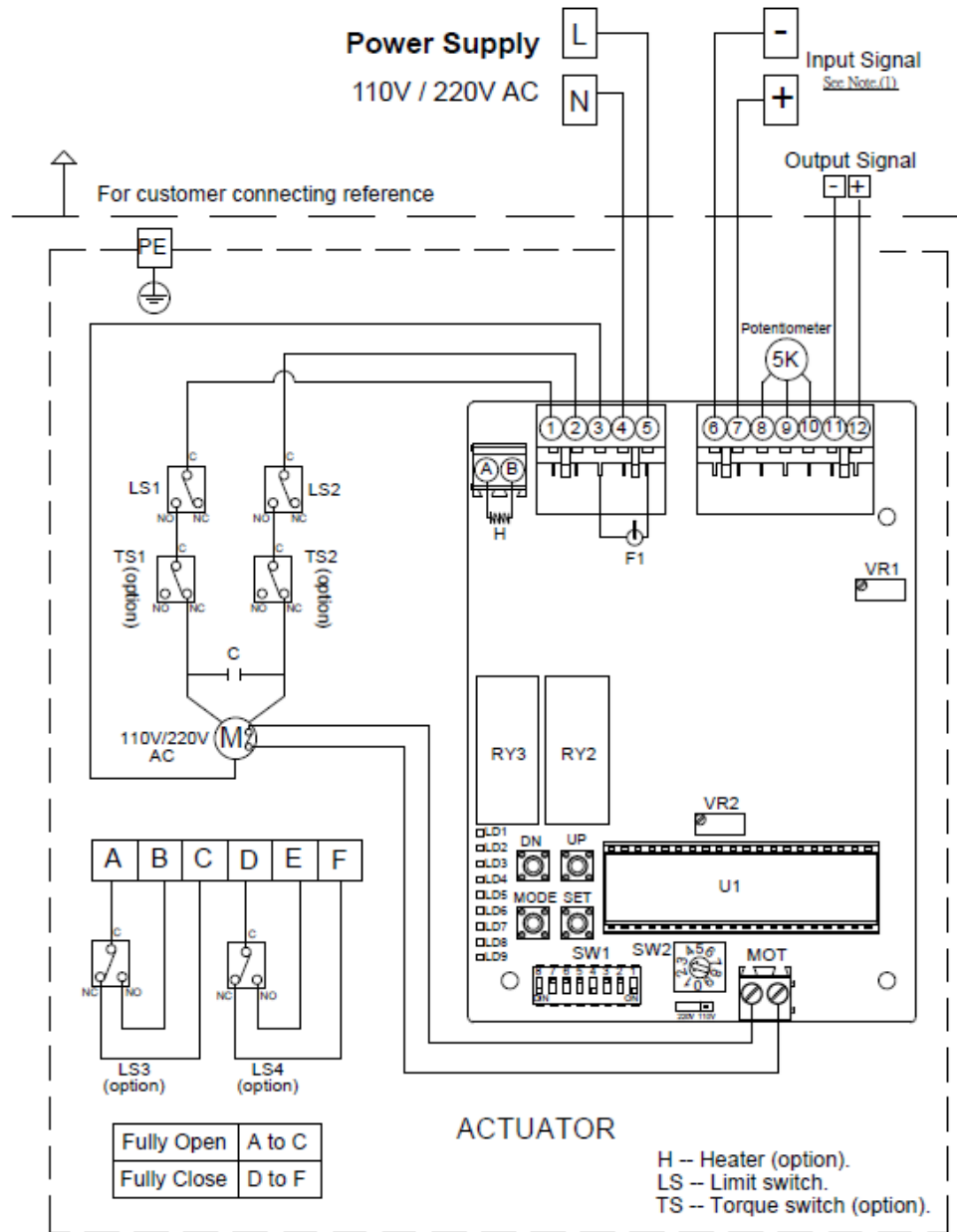


NOTE :

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".

4. BIM-2 could not install torque switches.

➤ 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".

LAMP SIGNALS

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)	<ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> a. Check the power supply and wiring b. Check the voltage. c. Check the wiring. d. Send back to factory for inspection.
LD5	<ul style="list-style-type: none"> 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. <p>**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.</p>	Confirm if the input signal is the same as dip switch setting (refer to P8~P9).
LD 6	Motor thermostat turns off.	<ul style="list-style-type: none"> a. Too high frequency for rated duty cycle(refer to P2). b. Motor thermostat (MOT) is not connected.
LD7	<ul style="list-style-type: none"> a. Output signal short circuit. b. Wrong connecting of the 2-10V input signal. 	<ul style="list-style-type: none"> a. Confirm the wiring of output signal. b. Confirm the input signal
LD8	Motor current is excessive.	<ul style="list-style-type: none"> 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:

1. Motor does not operate and overheats

Possibilities	Solution
a. Supply power to #3 · #4 simultaneously (Parallel Connection).	a. Check the wiring
b. The capacitor failed (whether the surface of the capacitor deforms).	b. Replace to a new part.
c. Valve's rubber is getting hardened or the valve's torque is excessive (it takes longer time to reach fully-closed position).	c. Use hand-wheel for test or change to a new valve.
d. Foreign objects in the flow stream.	d. Check if any obstructions
e. Broken motor stem or bearing.	e. Replace to a new parts
f. The limit switch for fully-closed does not trip.	f. Operate the actuator manually to fully-closed position and confirm if the limit switch trips.

2. The actuator is operated very well but the motor is hot.

Possibilities	Solution
a. Actuator operates too frequently (Starting frequency is too high).	a. Change system bandwidth or replace to a higher duty cycle actuator
b. Overload.	b. This situation often happens after operating for a long time. It is suggested to replace to a new valve.
c. Under or over rated voltage.	c. Check the supply circuit
d. Mechanical stops are reached by the gear train at fully-open or fully-closed position.	d. Reset the mechanical stops and cam
e. Wrong power supply.	e. Check the power supply.

3. When operating two or more actuators simultaneously, the actuator works abnormally some times and the motor is getting hot.

Possibilities	Solution
Parallel connection.	a. Check current values and install a relay respectively.

TROUBLE SHOOTING (cont.)

4. The valve can not fully-open or fully-closed by either power supply or hand-wheel.

Possibilities	Solution
a. The actuator does not mount with the valve tightly during installation process.	a. Contact technical department to solve the problem.
b. The torque of valve is larger than the torque of actuator.	b. Replace with larger actuator.
c. The set screw of the cam is loose.	c. Readjust the mechanical stops and limit switches
d. The installing angle of actuator and valve is not correct.	d. Check the angle of the valve and actuator.

5. The capacitor failed.

Possibilities	Solution
a. Overload (exceed the rated torque of actuator).	a. Replace with larger actuator.
b. Starting frequency is too high or ambient temperature is too high.	b. Replace with 75% duty cycle actuator
c. Over service life.	c. Replace the actuator.

➤ **Modulating controller:**

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