L

SERIES

Linear

Electric Valve Actuators

OPERATION MANUAL

SUN YEH ELECTRICAL IND. CO., LTD.

SY03-CA01A1-EN

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1 General Information

⚠ **Failure to follow safety instructions may cause serious injury, equipment damage, or voided warranty.**

1.1 Safety Instructions

- Installation, maintenance and repair works must be performed by trained personnel.
- The handling shall follow the safety and warning instruction contained in this manual.
- Before operation, the user should read and follow instructions contained in this operation manual. Failure to do this may result in damages and void warranty. Sun Yeh will not be liable for damages due to operator negligence or misuse.
- Local health and safety legislation shall be complied with.
- In a few cases, the surface temperature may exceed 60 °C (140 °F). Please check the surface temperature before operation, using an appropriate thermometer and wearing protective gloves before operation.

1.2 Installation Notices

⚠ **Operating by handwheel：**
Do not use any tools to increase force on handwheel for operating as this can damage the actuator or valve.

⚠ **Instruction for handwheel：**
Remove the stopper and press the handwheel toward the actuator before handwheel operation. After manual operation, pull the handwheel out to disengage the manual override and re-place the stopper to enable the electrical control.

- Please read operation manual and wiring diagram carefully before installation.
- Verify that supply voltage is in accordance with the data on nameplate to prevent short circuit or electrical/electronic parts damage caused by incorrect power input.
- Turn power off before wiring or maintenance.
- Connect the ground wire to PE point inside the electric actuator.
- To avoid functional failure caused by static, do not touch any components on the PCBA with metal tools or bare hands.
- Use suitable water-proof cable gland to ensure it fits the conduit entry size, diameter of the cable and the enclosure protection of the actuator when wiring. The water-proof cable gland must be tightened and flattened to the cable after wiring procedure and use proper black water-proof plug to seal unused conduit entry and fasten the top cover of the actuator to prevent dust or water from entering the actuator. The red plastic dust-proof plug is not meant for long-term use. Replace it with suitable water-proof connector to ensure the enclosure protection rating.

- Running time and rest time should be based on the standard of 75% duty cycle, or the motor may overheat and stop running.
- Actuator should be installed in an upright or horizontal position. Do not mount upside down or below a horizontal position.
- These units are not designed to operate in vacuum spaces or where an explosive atmosphere exists.
- Periodically inspect actuator enclosure to prevent dust from accumulating.

1.3 Inspection, Storage, Transport

1.3.1 Receiving / Inspection

- Carefully inspect the package for any damages resulting from shipping and report all damages to the freight carrier and seller.
- After unpacking the product and information packet, please keep the cartons and any packing materials in case of product return or replacement. Verify that the items on the packing slip or on the bill of lading are the same as what were ordered. If there is any discrepancy, please contact the seller.
- Verify if the technical data on nameplate is accordance with what was ordered.

1.3.2 Storage

- The actuator should be stored in a dry area with relative humidity of less than 90 % and at temperatures between - 20 °C to + 40 °C (- 4 °F to + 104 °F).
- The product shall be stored with suitable protection from corrosive substance that can damage the metal and insulating parts.
- The red dustproof plug and black waterproof plug should not be removed until the actuator is ready to be cabled. Use suitable cable glands with IP 67 protection when wiring and seal the unused cable entry with original black waterproof plug.

1.3.3 Transport

- Attach ropes or hooks for the purpose of lifting by hoist only to housing and not to handwheel.
- Actuators packaged in cartons can stand up to land, sea, or air transportation.
- Packaged actuators shall avoid of violent impact and strong vibrations and be protected from rain or snow.

1.3.4 Lubrication

- The gear train has been sufficiently lubricated at the factory. No additional lubrication is required.

2. Product Overview

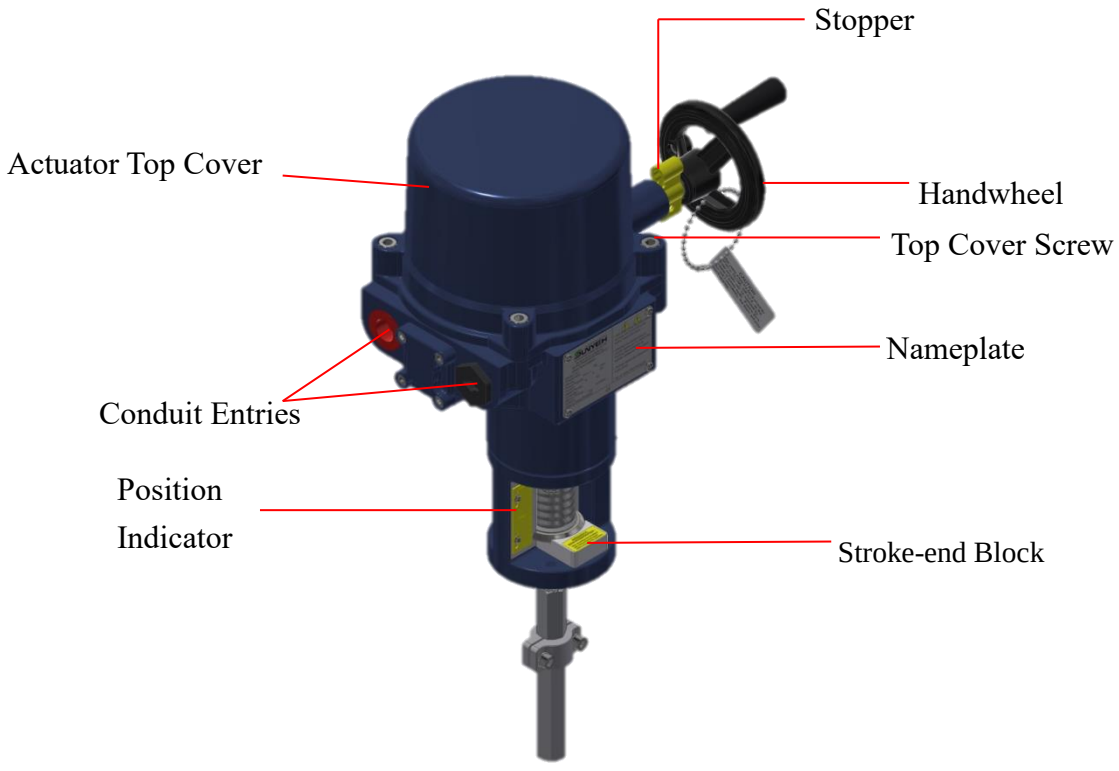
L series linear electric actuators offer thrust ranges from 250 to 2,000 kgf (550 to 4400 lbf). All models are equipped with modulating controllers and suitable for globe valves, gate valves and linear travel devices. These units are often used in the HVAC industry or industrial processes, especially suitable for steam or high temperature employment.

2.1 Features

- High alloy-steel gear trains with self-locking prevent back-drive.
- DC motor equipped with 75% duty cycle.
- External stem position indicator.
- Low-power consumption.
- Dry-powder coated aluminum alloy enclosure conforms to C3, NEMA 4X, 5 & IP 67 outdoor use.
- Manual operation can be applied in case of power outage.
- Built-in motor thermal protection.
- ISO 5210 mounting flange.

3. Product Mechanical Data

3.1 Parts Identification



3.2 Technical Information

Model	Thrust			Weight		Motor Power	Flange Type	Max. Stroke Length	
	kgf	lbf	kN	kg	lb	W	ISO5210	mm	inch
L-250	250	550	2.45	10.5	23	15	F07	50	2
L-500	500	1100	4.9	10.5	23	15	F07	50	2
L-1000	1000	2205	9.805	31.5	70	25	F10	100	4
L-2000	2000	4410	19.615	31.5	70	35	F10	100	4

- Duty Cycle

Model	Standard	Optional
L-250 to L-2000	75%	N/A

3.3 Valve Mounting Instructions

⚠ **DO NOT remove the stroke end block before completing installation.**

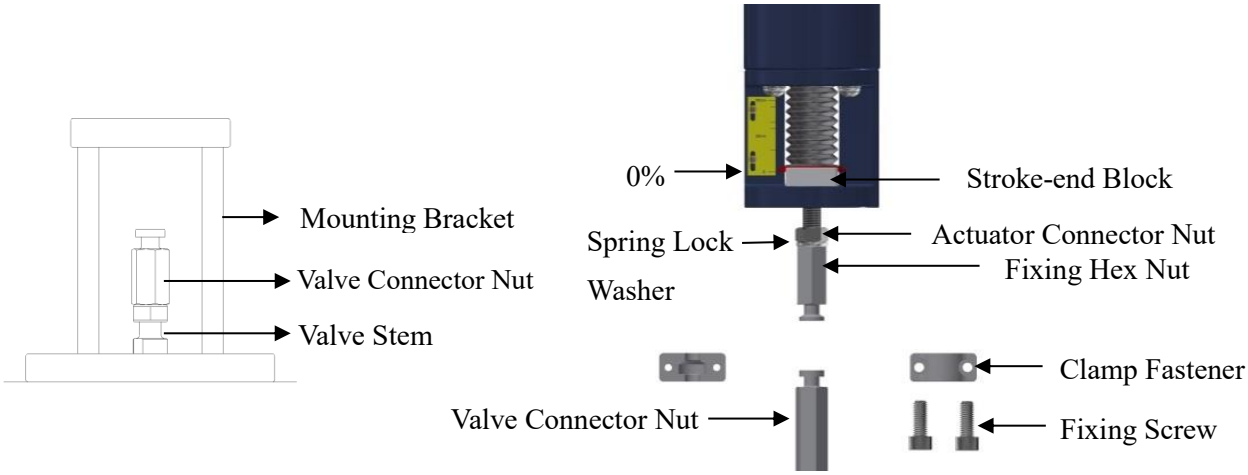
a. The actuator shall be sized to ensure that its thrust force output and stroke length meet the load and stroke requirements of valve and its ability to overcome the required duty cycle of application. Before mounting, verify that the valve connecting nut fits with size of valve stem and the actuator is in its fully-closed position (stroke position 0%).

b. Operate the valve to the fully-closed position.

c. Remove the fixing screws from the clamp fastener and lock the valve connector nut onto the valve stem.

d. Lock the actuator connector nut, spring lock washer, and fixing hex nut to the output shaft of the actuator as shown in figure below.

e. Install the actuator onto the mounting bracket and tighten the fixing screws securely.



f. Mount the actuator with bracket onto the valve and make sure the actuator connector nut connects the valve connector nut properly as figure below, and then tighten the fixing screws of clamp fastener securely.

⚠ **The tightening torque for both of the fixing screws must be the same to ensure the force applied evenly.**

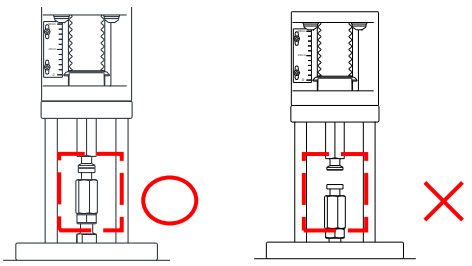


Figure 1：Correct

Figure 2：Incorrect

Note:
Rotate the valve connector nut until it touches the surface of actuator connector nut (Figure 1).

⚠ **Valve Connector Nut must have a minimum thread engagement of 1x the valve stem diameter. If not, adjust the Actuator Connector Nut accordingly.**

g. Tighten the valve nut with the Valve Connector Nut mutually.

⚠ **Fasten the Valve Connector Nut with wrench and tighten the valve nut toward the Valve Connector Nut (Figure 3).**

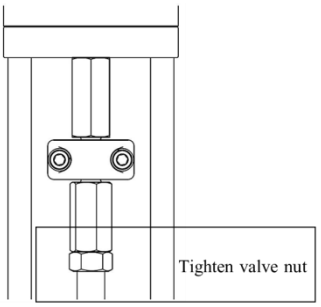


Figure 3

h. Remove the conduit entry plug to relieve the pressure inside the actuator for the ease of the top cover removal and gently remove the cover.

⚠ **The power must be off before removing the cover.**

i. Refer to section 4.2 (P.8) for wiring notices and connect the wires according to the wiring diagram labeled inside the cover of actuator.

j. Supply power to actuator.

⚠ **Care must be taken at all times as there are live circuits present that may cause electrical shock.**

k. Assemble the cover and secure cover screws firmly after setting.

⚠ **Please ensure that the O-ring seal is in good condition prior to cover installation.**

- After the actuator and valve are assembled completely, if the direction of the actuator (blue marked) needs to be changed according to actual working condition (Figure 4), please perform the adjustment steps as follows:

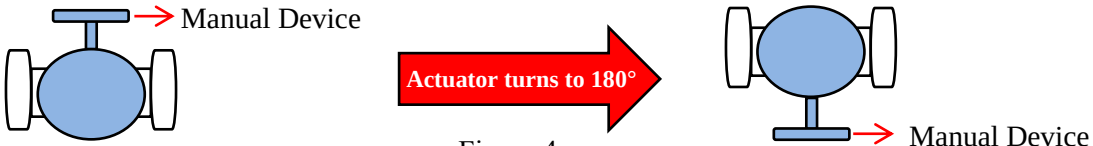


Figure 4

a. Loosen the fixing screws and remove the clamp fastener.

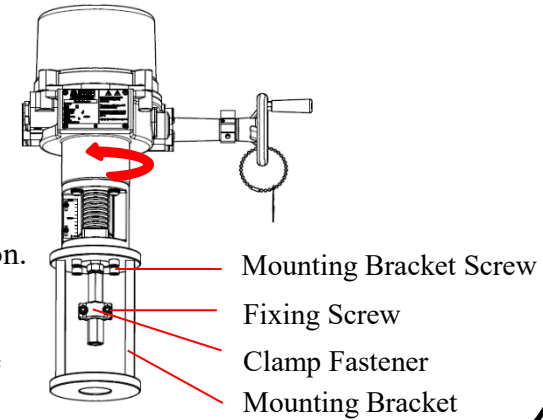
⚠ **Please keep the fixing screws properly in case of missing.**

b. Loosen the mounting bracket screws.

c. Rotate the actuator to the desired direction.

d. Tighten the mounting bracket screws.

e. Mount the clamp fastener and tighten the fixing screws securely.

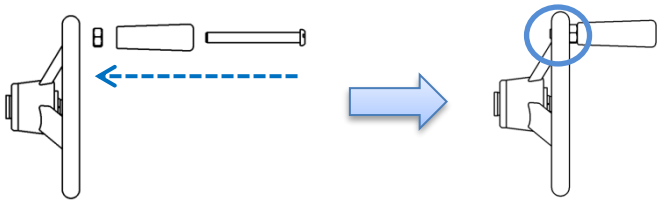


4. Mounting and Setup

4.1 Manual Device Installation

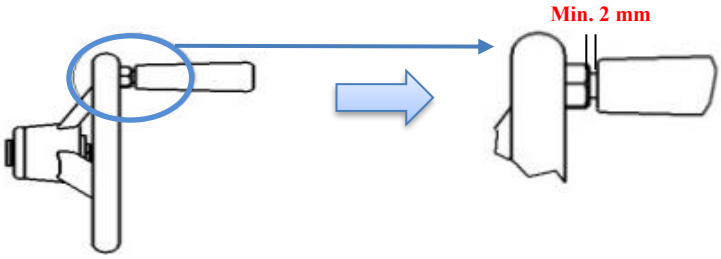
a. Pass the screw through the handle and tighten the nut onto handwheel.

⚠ **Do not overtighten.**



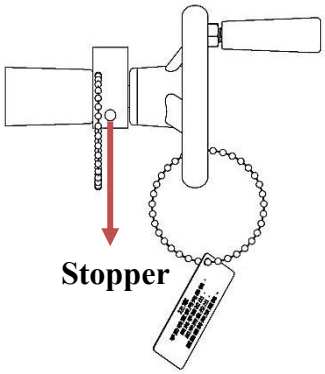
b. Secure the handle to the wheel with the slotted screw and tighten the locknut all the way down to the wheel. Ensure that the locknut is locked between the wheel and the handle.

⚠ **Leave a 2mm gap between the locknut and the handle as the figure below to allow the handle free to rotate and then to have a smooth manual operation.**



c. Assembly completed as shown in the figure below.

⚠ **Remove the stopper and press the handwheel toward the actuator before handwheel operation. After manual operation, pull the handwheel out to disengage the manual override and re-place the stopper to enable the electrical control.**



4.2 Wiring Instructions

⚠ **Turn power off before making the electrical connection!**

- Connect the ground wire to PE point placed on middle metal plate inside the electric actuator (a green screw) and wiring according to the wiring diagram inside the top cover.
- Each actuator is attached with a black water-proof plug and a temporary red dust-proof plug to conduit entries.

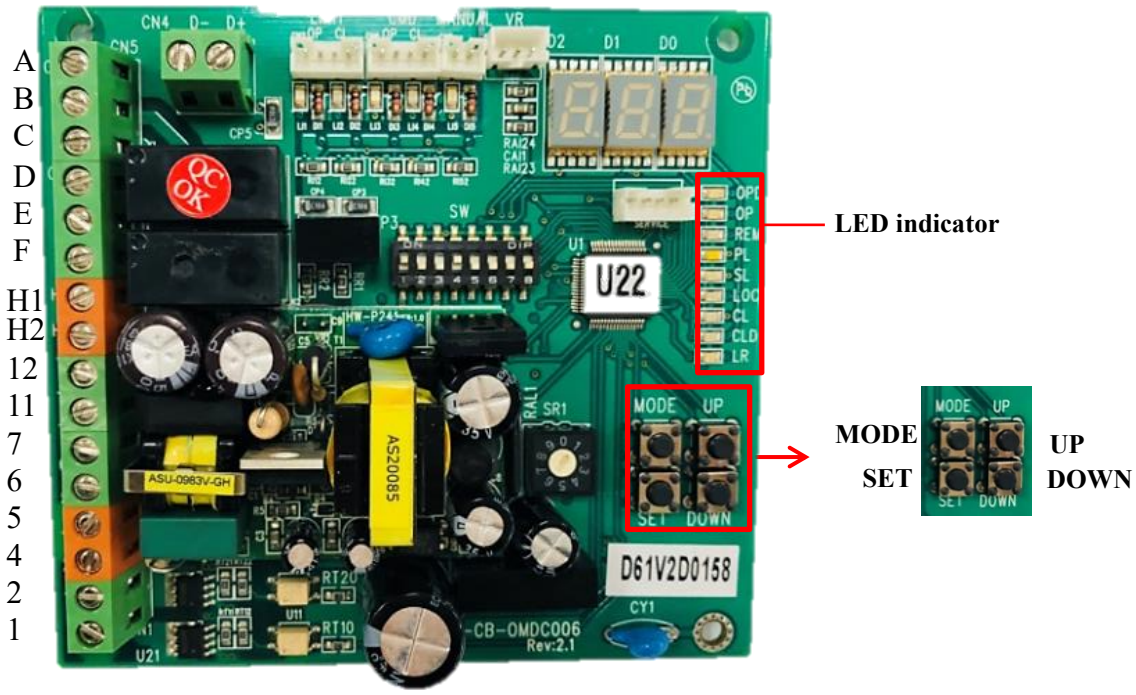
  ⚠ **Use correct size of fittings so as to not damage the threads.**
- Verify the supply power is in accordance with the data on the nameplate to prevent a short circuit and an electrical shock.

  ⚠ **Do not apply power to actuator before wiring, otherwise it can cause an electrical shock or damage components of the actuator.**
- The red plastic dustproof plug is not meant for long-term use. Use suitable cable glands with IP 67 protection when wiring and seal the unused cable entry with original black waterproof plug.

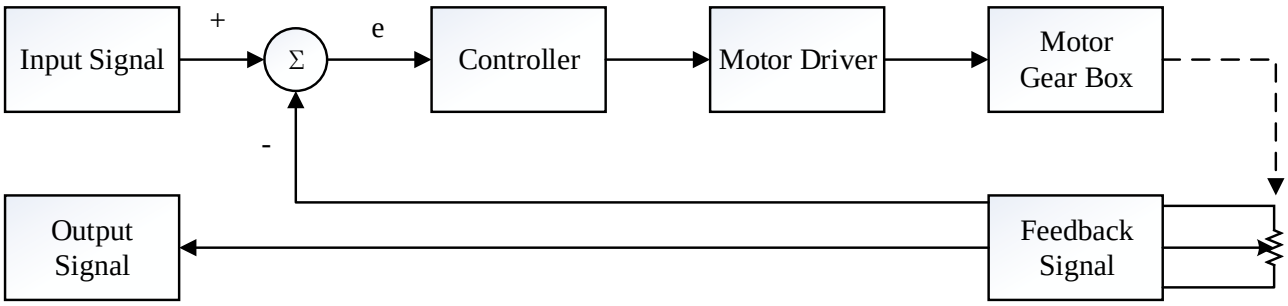
5. Modulating Control Board Adjustment

5.1 Modulating Control Board Surface

The layout is based on 110 / 220V.



5.2 Procedure

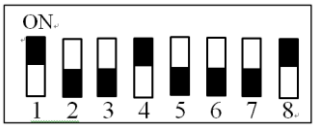


5.3 Dip Switch Setting (SW)

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 and switches 2, 3, 5, 6, 7 at OFF state.

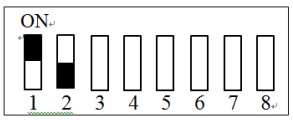
Please follow steps below if an adjustment of these settings are required.



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

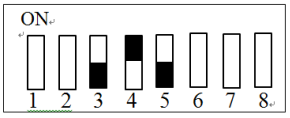
	1	2	3	4	5	6	7	8
Factory setting	ON	OFF	OFF	ON	OFF	OFF	OFF	ON
4 - 20 mA input	ON	OFF						
1 - 5 V input	OFF	OFF						
2 - 10 V input	OFF	ON						
MODBUS	ON	ON	ON	ON	ON			
4 - 20 mA output			OFF	ON	OFF			
2 - 10 V output			ON	OFF	ON			
Input 20 mA / 5 V / 10 V to operate valve to fully-open position	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

a. Input signal setting (1 - 2)



Input Signal	State of Switches
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 (3 - 5)

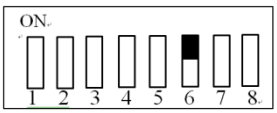


Output Signal	State of Switches
4 - 20 mA	3 at OFF, 4 at ON, 5 at OFF
2 - 10V	3 at ON, 4 at OFF, 5 at ON

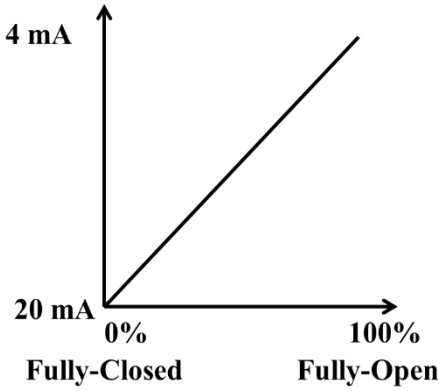
c. Setting of fail position when input signal fails (Switches 6 - 8)

⚠ **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 or 5 V or 10 V as a command for fully-closed positioning. The line graph below shows the signal level and the corresponding position of actuator.



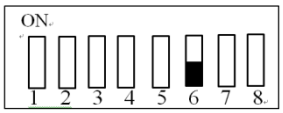
- When a low signal value is received, the actuator operates toward fully-open position and when a high signal value is received, the actuator operates toward fully-closed position.

Input Signal	Fully-Open (100%)	Fully-Closed (0%)
4 - 20 mA	4 mA	20 mA
1 - 5 V	1 V	5 V
2 - 10 V	2 V	10 V

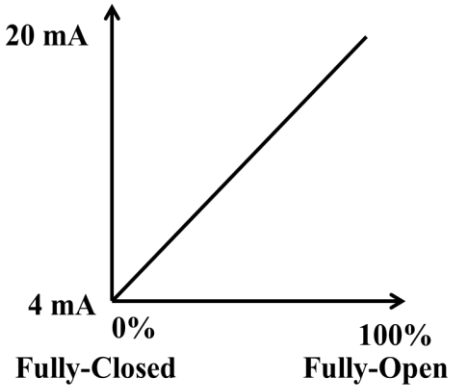
- The selection of the fail position while the input signal failed, please follow table below：

Signal Failed Position	State of Switch
Fully-Open (100%)	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.

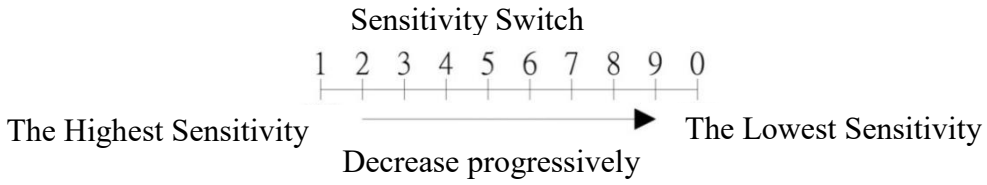
Input Signal	Fully-Open (100%)	Fully-Closed (0%)
4 - 20 mA	20 mA	4 mA
1 - 5 V	5V	1V
2 - 10 V	10V	2V

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

Signal Failed Position	Setting of Switch
Fully-Open (100%)	7 at ON, 8 at OFF
Fully-Closed (0%)	7 at OFF, 8 at ON.
The Last Position	7 at ON, 8 at ON.

5.4 Sensitivity Switch Setting (SR1)

When the sensitivity setting is higher, the resolution of the input signal will be higher, and relatively the dead band will be smaller. Excessive high sensitivity setting 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 turn down the sensitivity setting.



- **Original Factory Setting:**

  Select "MODBUS" control, the sensitivity is preset to 1.

  Select "analog signal" control, the sensitivity is preset to 7.

Control Mode	Figure
MODBUS control	
analog signal control	

- **When analog signal is selected:**

  Switch to 1: The highest sensitivity.

  Switch to 0: The lowest sensitivity.

5.5 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
LR	MCU Indication

5.6 Stroke Setting

a. Press “MODE” 5 times to get into AUo.

b. Press and hold “SET” around 5 sec until “LOC” comes on to enter Auto setting mode.

c. When the Auto setting is completed, “LOC” comes off and the actuator stops running. The ravel setting is completed.

5.7 Signal Setting

⚠ **If the travel end positions have not been set up properly per 5.6, please follow steps below to recalibrate.**

- **Input signal setting for fully-closed position**
  a. Press “MODE” several times until 1 0 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 1 0 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  displays, then press “SET” once to enter signal setting mode.

  b. Press ”UP” or ”DOWN” until  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  displays, then press “SET” once to enter signal setting mode.

  b. Press ”UP” or ”DOWN” until  displays.

  c. Press and hold “SET” around 3 sec.

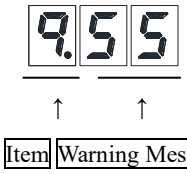
  d. Select signal value by pressing “UP” or “DOWN” until the required value is achieved.

  e. Press “SET” once and “Mode” 2 times to complete the output signal setting for fully-open position.

5.8 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 (9,8,7…0)	Warning Message	Solution
9. (The latest data) 8. 7. 6. 5. 4. 3. 2. 1. 0. (The oldest data)	01 Abnormal Input signal	a. Check if the input signal fails.
	03 Abnormal Handwheel	a. Check if the handwheel is pulled out completely.
	55 No abnormal records	

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

- **Example**

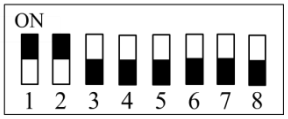
a. If you want to check the latest data, press “MODE” several times until AL displays → Press “Set” once → The LED display will show the latest data .

b. If you want to check the eighth data, press “MODE” several times until AL displays → Press “SET” once →Press “DOWN” 7 times and the LED display will show the eighth data 2.

5.9 MODBUS Setting

⚠ **MODBUS and modulating control cannot service at the same time.**

- **MODBUS :**
  Set switches 1 - 2 at “ON” state and switches 3 - 8 at “OFF” state.



- **Baud rate setting**
  a. Press ”MODE” 2 times until PAr displays.
  b. Press ”SET” once, then SPd will display.
  c. Press ”DOWN” 10 times until bAU displays.
  d. Press and hold ”SET” around 3 sec until the LED indicator flashes to enter setting mode.
  e. Press ”UP” or ”DOWN” to set the required baud rate (default value #4).

Setting Value	Baud Rate
4 (default)	9600
5	19200

  f. Press “SET” once to complete the setting.

- **Station setting**
  a. Press “DOWN” once, then Id will display.
  b. Press and hold “SET” around 3 sec until the LED indicator flashes to enter setting mode.
  c. Press ”UP” or ”DOWN” to select the required station (Station Range:1 to 127, default Station: 1).
  d. Press “Set” once to complete the setting.

- Press ”Mode” 4 times to get back to the home page.

5.10 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 setting (%)	0 to 64

6 Troubleshooting

Floating Control

Motor can not operate or overheats.

Possible problems	Solution
a. The seating thrust of valve increased due to oxidized seals and has resulted in a thrust overload on actuator.	a. Manual operate to check if it can be operated, if not, replace to a new valve.
b. Jammed pipe or stuck valve seat.	b. Check if any blockage or obstacle in pipe and remove.
c. Motor shaft or bearing were stuck.	c. Replace a new motor.
d. Handwheel is not pulled out completely	d. Press the handwheel toward the actuator, then pull it out completely.

The actuator operates but the motor is hot.

Possible problems	Solution
a. The thrust of valve overload.	a. This situation occurs frequently after the valve has been operating for a period of time. It is suggested to replace with a new valve.
b. Wrong power supply.	b. Check the power supply.
c. Actuator operates too frequently and exceeded duty cycle rating.	c. Adjust the system bandwidth or reduce the frequency of operation.

The valve cannot operate either electrical operation or manual operation.

Possible problems	Solution
a. The actuator was mounted to the valve improperly.	a. Please refer to 3.3 (P.5-P.6) installation steps.
b. The thrust of valve is larger than the thrust of actuator.	b. Replace a new valve or a larger size actuator.

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.

Modulating Control

Modulating control is not functioning

Possible problems	Solution
a. Handwheel is not pulled out completely (“PL” LED indicator is glittering).	a. Press the handwheel toward the actuator then pull it out completely and check if the “LI5” indicator comes on.
b. The modulating board is faulty, and the actuator cannot operate or can only operate in one direction.	b. Replace a new modulating board.
c. Input wrong signal type.	c. Check if the input signal is correct. Please refer to 5.7 (P.10 - P.16).
d. Modulating board failed and causes actuator can not operate or only operate in a single direction.	d. Replace a new modulating board.

The LED indicators (LR) illuminated or not illuminated (off).

Possible problems	Solution
a. Modulating board failed.	a. Replace a new modulating board.

7 Warranty

Sun Yeh Electrical Ind. Co., Ltd warrants that for a period of twelve months from the date of manufacture it will either repair or replace, at its option, any of its products which prove to be defective in material or workmanship. This warranty does not cover damage resulting from causes such as abuse, misuse, modification or tampering by users. This warranty is extended only to the immediate purchaser of the Sun Yeh product and is not transferable. To obtain service under this warranty, the purchaser must first acquire a return authorization from Sun Yeh. Products must be returned to Sun Yeh under freight prepaid.

This warranty is in lieu of all other obligations, liabilities or expressed warranties. Any implied warranties, including any implied warranty of merchantability are hereby expressly excluded. In no event shall Sun Yeh be liable for special, incidental or consequential damages arising in connection with the use of its products, or for any delay in the performance of this warranty due to cause beyond its control.

8 Disposal

Please obey the local environment regulation for equipment scrapping.

SUNYEH

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