OM

SERIES

Quarter-turn

Electric Valve Actuators

OPERATION MANUAL

SUN YEH ELECTRICAL IND. CO.,LTD.

SY01-CA01A1-EN

Contents

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

⚠ **Please manually operate the valve (damper) to mid-travel position by the handwheel and power up to check if it rotates properly in order to verify the phase sequence is correct. If the running direction is incorrect after supplying power, please correct the phase errors by changing the connection of any two of power supply wires U, V, W to prevent the actuator from mechanical damages.**

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

- 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.
- Do not parallel wire multiple actuators together without using an extra relay or equipping with Isolation Relay Module.
- 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 original 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.

- 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.
- If the actuator is installed in a low-temperature environment and not operated according to the rated duty cycle, the initial startup time may be delayed.

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 water-proof 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 water-proof 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

OM series quarter-turn electric actuators offer torque ranges from 35 Nm to 4,500 Nm (310 in-lb to 40,000 in-lb). These actuators come standard with a C3, NEMA Type 4X, 5 & IP67 enclosure for outdoor use. All models are ISO 5211 compliant and equipped with a continuous mechanical position indicator and manual override (except BM-2 and OM-A). The manual override can be operated without clutch and brake.

2.1 Features

- High alloy-steel gear trains with self-locking prevent back-drive.
- Clutch-less manual override.
- Dry-powder coated aluminum alloy enclosure conforms to C3, NEMA Type 4X, 5 & IP 67 outdoor use.
- ISO 5211 mounting flange.
- Mechanical end stops.
- Domed position indicator.
- Built-in motor thermal protection.

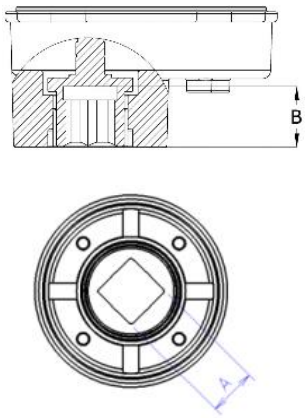
3. Product Mechanical Data

3.1 Parts Identification

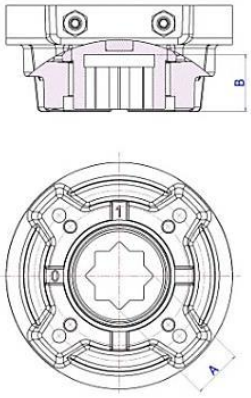
3.2 Technical Information

Model	Torque		Weight		Motor Power	Manual Override	Flange Type
	Nm	in-lb	kg	lb	W		ISO 5211
OM-1	35	310	2	4.4	10	Lever	F03 / F05
OM-A	50	445	3	6.6	10	N/A	F05 / F07
OM-AM	50	445	3	6.6	10	Handwheel or Lever	F05 / F07
OM-F	65	575	11	24.3	60	Handwheel	F07 / F10
OM-J	80	708	3	6.6	5	Lever	F05 / F07
OM-2	90	800	10.5	23.1	40	Handwheel	F07 / F10
BM-2	120	1065	5.5	12.1	40	N/A	F07
OM-G	120	1065	11	24.3	60	Handwheel	F07 / F10
							F07 / F10
OM-3	150	1330	10.5	23.1	40		F07 / F10
OM-H	300	2655	15	33.1	60		F07 / F10
OM-4	400	3540	20	44.1	80		F10 / F12
OM-5	500	4430	20	44.1	80		F10 / F12
OM-6	650	5755	20	44.1	80		F10 / F12
OM-7	1000	8855	36	79.4	120		F12 or F14
OM-8	1500	13280	36	79.4	120		F12 or F14
OM-9	2000	17710	68.5	151	180		F14 or F16
OM-10	2500	22140	68.5	151	180		F14 or F16
OM-11	3000	26565	68.5	151	180		F14 or F16
OM-12	3500	31000	68.5	151	220		F14 or F16
OM-13	4500	40000	102.5	226	220		F16 / F25

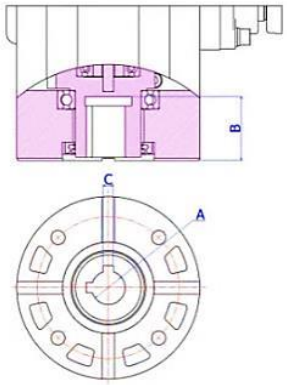
3.3 Mounting Base Details



【BM-2】



【OM-A, OM-AM, OM-F, OM-G, OM-H, OM-J and OM-1 to OM-6】



【OM-7 to OM-13】

Model	Flange Type	Output Drive (A)		Depth of Output Drive (B)		Key (C)	
	ISO 5211	mm	inch	mm	inch	mm	inch
OM-1	F03 / F05	14	0.551	17	0.669	-	-
OM-A	F05 / F07	17	0.669	20	0.787	-	-
OM-AM,OM-J	F05 / F07	17	0.669	20	0.787	-	-
OM-F,OM-G	F07 / F10	22	0.886	30	1.181	-	-
OM-2 to OM-3	F07 / F10	22	0.886	30	1.181	-	-
BM-2	F07	22	0.886	35	1.377	-	-
OM-H	F07 / F10	22	0.886	30	1.181	-	-
OM-4 to OM-6	F10 / F12	36	1.417	40	1.574	-	-
OM-7 to OM-8	F12 or F14	35	1.377	60	2.362	10 × 10	0.393×0.393
OM-9 to OM-12	F14 or F16	75	2.952	100	3.937	12 × 10	0.472×0.393
OM-13	F16 / F25	72	2.834	110	4.33	20 × 12	0.787×0.472

3.4 Sizing

a. The actuator shall be sized to ensure that its torque output meets the load requirements of valve and its ability to overcome the required duty cycle of application (As a MINIMUM, a 30% safety factor is suggested for the calculation of torque requirement).

- If the maximum torque of 5" valve is 80 Nm → 80 × 1.3 (safety factor) = 104 Nm
  104 Nm < 150 Nm (OM-3) →OK!
  104 Nm > 90 Nm (OM-2) →**Not OK**!

b. In cases where the actuator does not directly fit onto the valve, a mounting kit is required. Please ensure the bracket and coupling are properly designed and manufactured to withstand the torque output of the actuator.

3.5 Duty Cycle

- The standard duty cycle for OM series is 30% and 50% or 75% is for option. The duty cycle is the relationship between the running time and resting time. It is calculated as below:

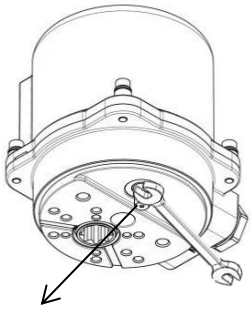
$$\text{Duty Cycle} = \frac{\text{Running Time (Sec)}}{\text{Running Time (Sec)} + \text{Rest Time (Sec)}} \times 100\ \%$$

$$\Rightarrow \text{Rest Time (Sec)} = \frac{\text{Running Time (Sec)} \times (1 - \text{Duty Cycle})}{\text{Duty Cycle}}$$

- **If the running time for OM-2 is 15 sec, 30% duty cycle, the rest (off) time shall be calculated as below:**
  →15 × [(1–30%) / 30%] = 35 The rest time will be 35 sec.
- **If the running time for OM-2 is 15 sec, 75% duty cycle, the rest (off) time shall be calculated as below:**
  →15 × [(1–75%) / 75%] = 5 The rest time will be 5 sec.
  Note: For higher duty cycles, choose the 75% duty cycle.
  ⚠ **One cycle consists of open-rest-close-rest.**

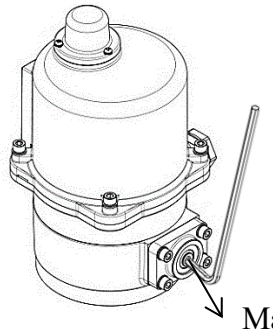
4. Mounting and Setup

- **OM-1, OM-AM, OM-J**
  - OM-1：Use a 8 mm wrench to rotate the shaft. Max. torque：5 Nm.
  - OM-AM：Use a 5 mm wrench to rotate the shaft. Max. torque：5 Nm.
  - OM-J：Use a 5 mm wrench to rotate the shaft. Max. torque：7 Nm.



Manual Position

OM-1



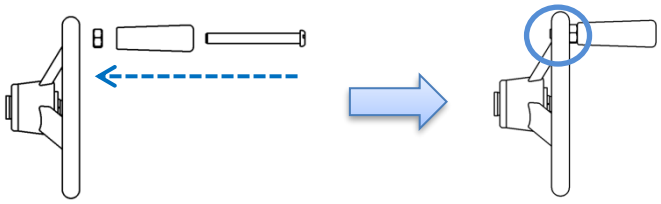
Manual Position

OM-AM, OM-J

- **OM-AM (Optional)**

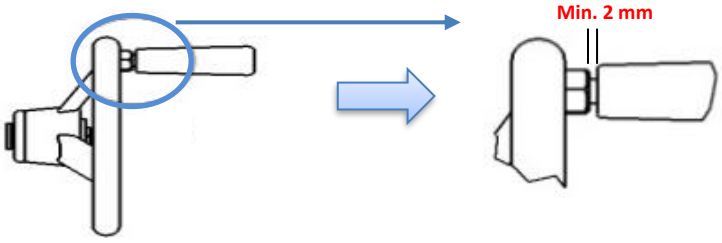
a. Pass the screw through the handle and tighten the nut onto handwheel.

⚠ **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.

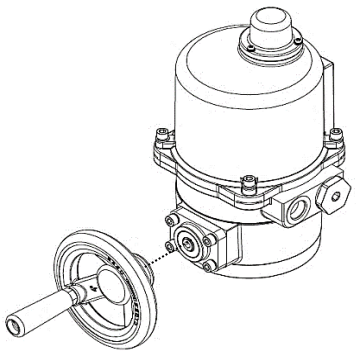
⚠ **Leave a 2 mm gap between the locknut and the handle as the figure below to allow the handle free to rotate and then to have a smooth manual operation.**



c. After aligning the handwheel shaft, insert it into the actuator's mounting hole.

⚠ **After manual operation is completed, be sure to remove the handwheel.**

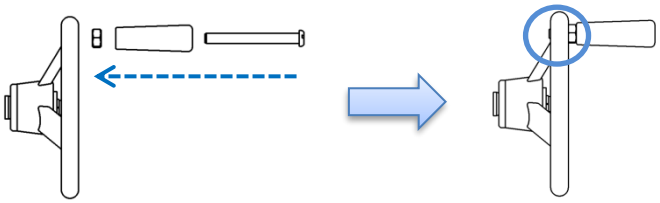
⚠ **Do not install the handwheel on the actuator during electric operation to avoid potential hazards.**



- **OM-2 to OM-13, OM-F, OM-G, OM-H**

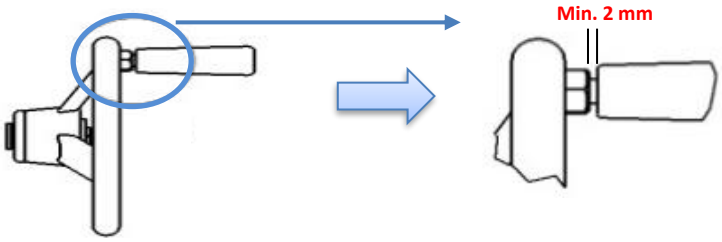
d. Pass the screw through the handle and tighten the nut onto handwheel.

⚠ **Do not overtighten.**



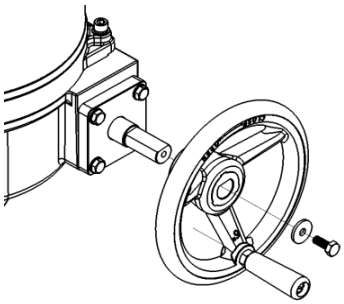
e. Secure the handle to the wheel with the slotted screw and tighten the locknut all the way down to the wheel. Ensure that the locknut is locked between the wheel and the handle.

⚠ **Leave a 2 mm 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.**

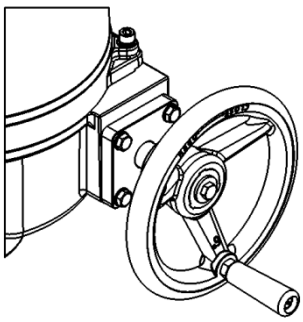


f. Slide fixing screw through washers and handwheel and secure them to override shaft as shown in the figure below.

⚠ **Turn off power when installing handwheel.**



g. Assembly completed as shown in the figure below.



4.1 Valve Mounting Instructions

a. Make sure both the valve and actuator are in the same position before mounting, either fully-open or fully-closed. If not, use the manual override to correct this.

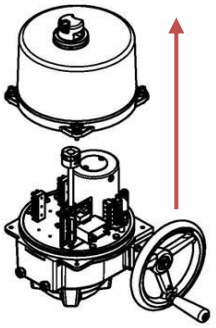
b. Once mounted together, either directly or with a mounting kit, ensure that they are properly secured together and all fasteners are tightened.

⚠ **Remove all of valve handle parts, for example, the handle or open / close mechanical stops so as to not interfere with the actuator.**

c. Check again that the valve and actuator are in the same position.

d. 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.**



e. Refer to section 4.2 (P.10) for wiring instructions and connect the wires according to the wiring diagram labeled inside the cover of actuator.

⚠ **Before operating a three-phase voltage actuator, please manually operate it to mid-travel position by the handwheel and power up to check if it rotates properly in order to verify the phase sequence is correct. If it is incorrect, please correct the phase errors by changing the connection of any two of power supply wires U, V, W to prevent the actuator from mechanical damages.**

f. Supply power to actuator.

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

g. Re-calibration may be required for the end positions, refer to 4.3 (P.11) for further instructions.

h. For modulating units, refer to 6 (P.19 - P.59) setting instructions.

⚠ **Use the insulated wires and length should be less than 30 m.**

⚠ **A minimum of 18 AWG wire is recommended for all field wiring.**

⚠ **Turn power off before changing any settings.**

i. 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.**

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 IP67 protection when wiring and seal the unused cable entry with original black water-proof plug.

4.3 Actuator Set-up

⚠ **The power must be off during this procedure so as to avoid damage to the actuator.**

⚠ **Do not make adjustments to the mechanical end stops when actuator is in motion.**

⚠ **All steps below must be completed before normal operation.**

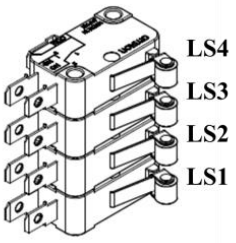
The actuators have been set and calibrated at the factory. Most of products will not require recalibration of these settings. However these are general settings. After valve and actuator are bolted together, apply power to verify the end positions are correct. If an adjustment is required, please follow steps below. When the actuator is equipped with modulating controller, signal setting for open and close position has to be re-set accordingly, please refer to 6.1.4 and 6.2.5 .

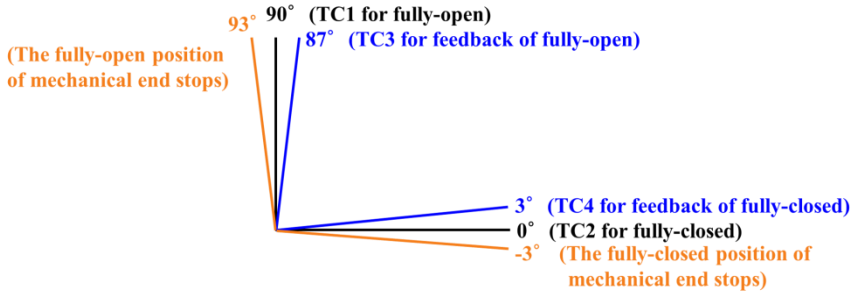
4.4.1 Instructions

- The travel cams are set to control the open and closed position of the actuator. See below procedure for corresponding actuator model:
  OM-A, OM-AM, OM-1 to OM-13, OM-F, OM-G, OM-H, and OM-J: When the travel cams activate the limit switch, the actuator will start to run; otherwise, it will stop.

- The standard with two limit switches (LS1 & LS2) and cams (TC1 & TC2).
  LS1 & LS2：LS1 is for open and LS2 is for close. Travel limit settings for starting and cutting off the motor power to reach the fully-open and fully-closed positions.
  LS3 & LS4 are optional. They allow external equipment to confirm that the valve has reached the fully-open and fully-closed positions.

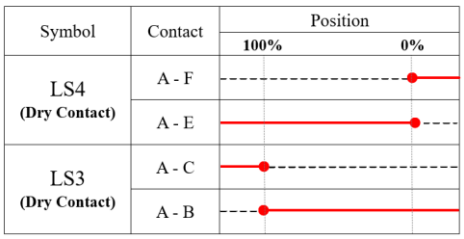
  ⚠ **LS3 (LS4) should activate before LS1 (LS2).**



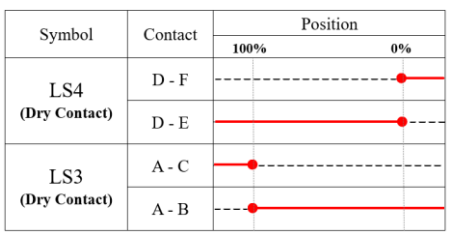


- Dry contact sequence diagram (LS3 & LS4)

【OM-1, OM-A, OM-AM, OM-J】



【OM-2 to OM-13, OM-F, OM-G, OM-H】

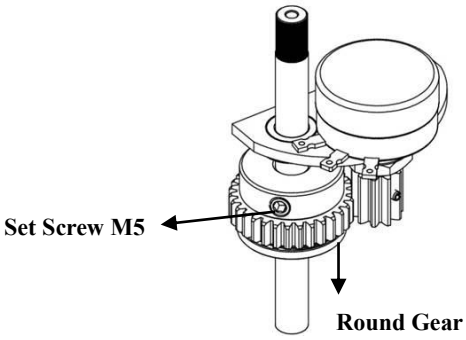


- ➢ Solid line (——)：Dry contact in conductive state.
- ➢ Dotted line (-----)：Dry contact in non-conductive state.

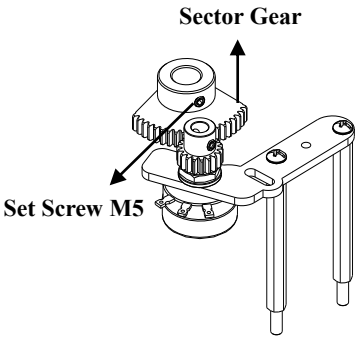
4.4.2 Adjustment Steps

a. Turn power off.

b. When optioned with modulating control or potentiometer, loosen the M5 set screw on the sector gear or round gear.

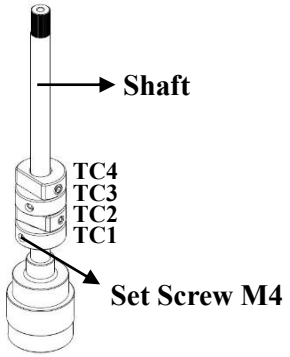


【OM-1, OM-A, OM-AM, and OM-J】

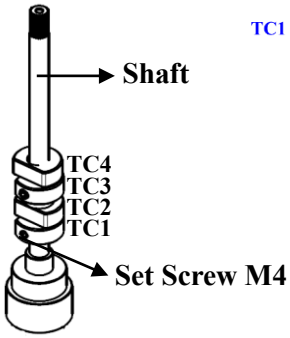


【OM-2 to OM-13, OM-F, OM-G, and OM-H】

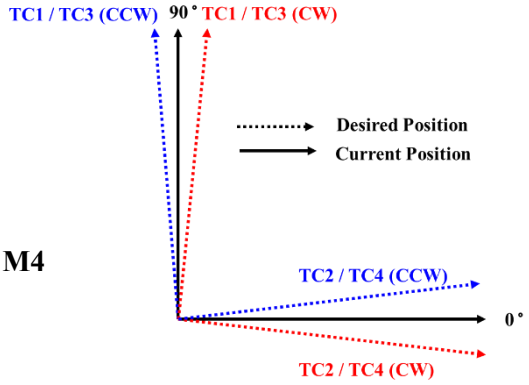
c. **OM-A, OM-AM, and OM-J (Fully-open Position / Feedback Signal Adjustment)**



【OM-A, OM-AM】



【OM-J】



Direction	Travel Cams	Instructions
Closed	TC2 TC4 (Optional)	**Clockwise: increase closing degree.** **Counter-clockwise: decrease closing degree.**
Open	TC1 TC3 (Optional)	**Clockwise: decrease opening degree.** **Counter-clockwise: increase opening degree.**

1. Loosen the M4 set screw of cam TC1 with a 2 mm Allen Key.

   TC1 (Fully-open Position):

   - Adjust the cam according to the required position.
     - ➢ Increase the fully-open degree: rotate the cam TC1 counter-clockwise.
     - ➢ Decrease the fully-open degree: rotate the cam TC1 clockwise.
   - After the adjustment is completed, please securely tighten the cam TC1.
   - Apply power to check if the fully-open position is correct. If it is not correct, please repeat the steps above.

TC3 (Feedback Signal):

- Before the adjustment, please complete the TC1 (Fully-open position) adjustment steps first.
- Slowly rotate the cam TC3 counterclockwise until it triggers the limit switches and a light click is heard. Then, rotate the cam TC3 clockwise until a light click is heard. Afterward, fine-tune the degree clockwise slightly and then tighten cam TC3.
  - ⚠ **TC3 should trip one second before TC1.**
  - ⚠ **This step is applicable to the two optional auxiliary limit switches.**

2. After the adjustment is completed, check again that the set screw is securely tightened.

d. **OM-A, OM-AM, and OM-J (Fully-Closed Position / Feedback Signal Adjustment)**

1. Loosen the M4 set screw of cam TC2 with a 2 mm Allen Key.

TC2 (Fully-closed Position):

- Adjust the cam according to the required position.
  - ➢ Increase the fully-closed degree: rotate the cam TC2 clockwise.
  - ➢ Decrease the fully-closed degree: rotate the camTC2 counter-clockwise.
- After the adjustment is completed, please securely tighten the cam TC2.
- Apply power to check if the fully-closed position is correct. If it is not correct, please repeat the steps above.

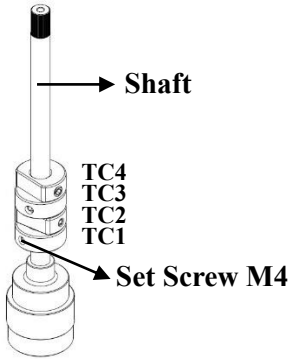
TC4 (Feedback Signal):

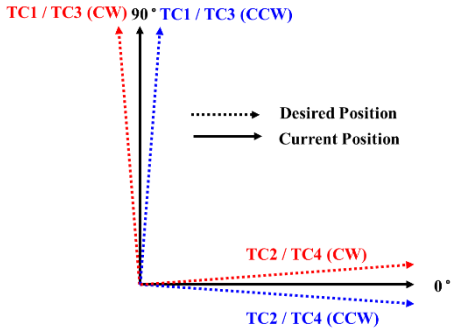
- Before the adjustment, please complete the TC2 (Fully-closed position) adjustment steps first.
- Slowly rotate the cam TC4 clockwise until it triggers the limit switches and a light click is heard. Then, rotate the cam TC4 counter-clockwise until a light click is heard. Afterward, fine-tune the degree counter- clockwise and then tighten the cam TC4.
  - ⚠ **TC4 should trip one second before TC2.**
  - ⚠ **This step is applicable to the two optional auxiliary limit switches.**

2. After the adjustment is completed, check again that the set screw is securely tightened.

e. **OM-1 to OM-13, OM-F, OM-G, and OM-H (Fully-open Position / Feedback Signal Adjustment)**

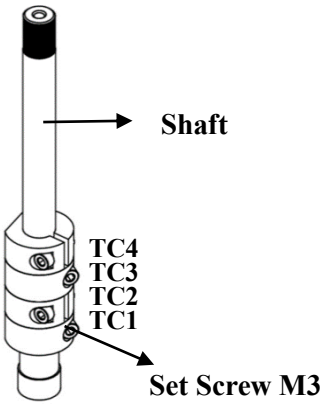
- **OM-1**

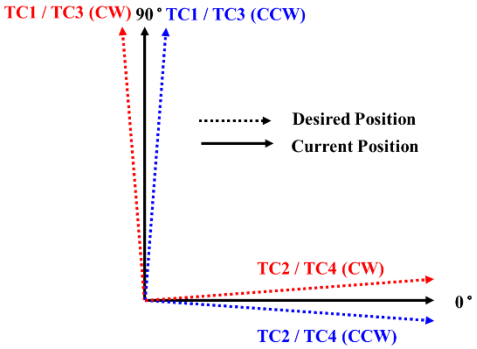




Direction	Travel Cams	Instructions
Closed	TC2 TC4(Optional)	**Clockwise: decrease closing degree.** **Counter-clockwise: increase closing degree.**
Open	TC1 TC3(Optional)	**Clockwise: increase opening degree.** **Counter-clockwise: decrease opening degree.**

- **OM-2 to OM-13, OM-F, OM-G, and OM-H**

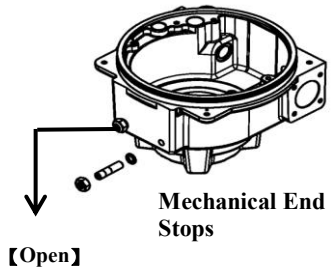




Direction	Travel Cams	Instructions
Closed	TC2 TC4 (Optional)	**Clockwise: decrease closing degree.** **Counter-clockwise: increase closing degree.**
Open	TC1 TC3 (Optional)	**Clockwise: increase opening degree.** **Counter-clockwise: decrease opening degree.**

1. Remove the cover.
2. Loosen the locknut and unwind **Open** Mechanical end stop screws for 7 turns.

   ⚠ **Manual device setting is available for OM-2 to OM-13, OM-F, OM-G, and OM-H.**



3. Use the manual override to turn the valve to fully-open position.
4. Loosen the cam screw:
   - OM-1: Loosen the M4 set screw of cam TC1 with a 2 mm Allen Key.
   - OM-2 to OM-13, OM-F, OM-G, and OM-H: Loosen the M3 set screw of cam TC1 with a 2.5 mm Allen Key.

   TC1 (Fully-open Position):
   - Slowly rotate the cam TC1 clockwise until the limit switch is triggered and a light click is heard. Then, rotate the cam TC1 counter-clockwise until a light click is heard, and then tighten the cam TC1.
   - Apply power to check if the fully-open position is correct. If it is not correct, please repeat the steps above.

   TC3 (Feedback Signal):
   - Before the adjustment, please complete the TC1 (Fully-closed Position) adjustment steps first.
   - Slowly rotate the cam TC3 clockwise until it triggered the limit switch and a light click is heard. Then rotate the cam TC3 counter-clockwise until a light click is heard. Afterward, fine-tune the degree counter-clockwise and then tighten the cam TC3.

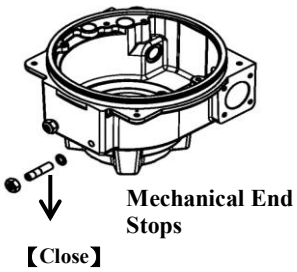
     ⚠ **TC3 should trip one second before TC1.**

     ⚠ **This step is applicable to the two optional auxiliary limit switches.**
5. After the adjustment is completed, check again that the set screw is securely tightened.

f. **OM-1 to OM-13, OM-F, OM-G and OM-H (Fully-closed Position / Feedback Signal Adjustment)**

1. Remove the cover.
2. Loosen the locknut and unwind **Close** Mechanical end stop screws for 7 turns.

   ⚠ **Manual device setting is available for OM-2 to OM-13, OM-F, OM-G and OM-H.**
3. Use the manual override to turn the valve to fully-closed position.



4. Loosen the cam screw:
   - OM-1: Loosen the M4 set screw of cam TC2 with a 2 mm Allen Key.
   - OM-2 to OM-13, OM-F, OM-G, and OM-H: Loosen the M3 set screw of cam TC2 with a 2.5 mm Allen Key.

TC2 (Fully-closed Position):

- Slowly rotate the cam TC2 counter-clockwise until it triggered the limit switch and a light click is heard. Then, rotate the cam TC2 clockwise until a light click is heard and tighten the cam TC2.
- Apply power to check if the fully-closed position is correct. If it is not correct, please repeat the steps above.

TC4 (Feedback Signal):

- Before the adjustment, please complete the TC2 (Full-closed Position) adjustment steps first.
- Slowly rotate the cam TC4 counter-clockwise until the limit switch is triggered, and a light click is heard Then, rotate the cam TC4 clockwise until a light click is heard. Afterward, fine-tune the degree clockwise and then tighten the cam TC4.

  ⚠ **TC4 should trip one second before TC2.**

  ⚠ **This step is applicable to the two optional auxiliary limit switches.**

5. After the adjustment is completed, check again that the set screw is securely tightened.

g. Supply power to the fully-open position. Screw in the **Open** (left) Mechanical end stop screw until it bottoms out (refer to e of P.15), then turn back for 1/2, 3/4 or 1 turn based on the actuator model listed below.

- OM-2 to OM-6, OM-F, OM-G and OM-H: 1 turn
- OM-7 to OM-8: 3/4 turn
- OM-9 to OM-13: 1/2 turn

h. Tighten the locknut. (Max. Torque: 5.88 Nm)

i. Supply power to the fully-closed position. Screw in the Close (right) mechanical end stop screw until it bottoms out (refer to f of P.16), then turn back for 1/2, 3/4 or 1turn based on the actuator model listed below.

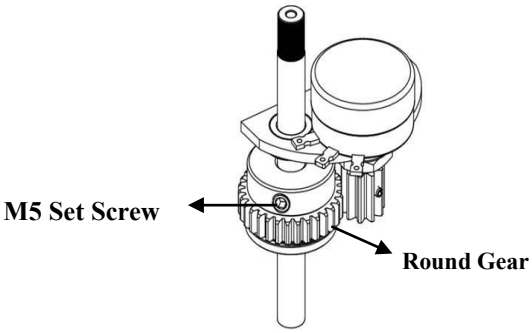
- OM-2 to OM-6, OM-F, OM-G and OM-H: 1 turn
- OM-7 to OM-8: 3/4 turn
- OM-9 to OM-13: 1/2 turn

j. Tighten the locknut. (Max. Torque: 5.88 Nm)

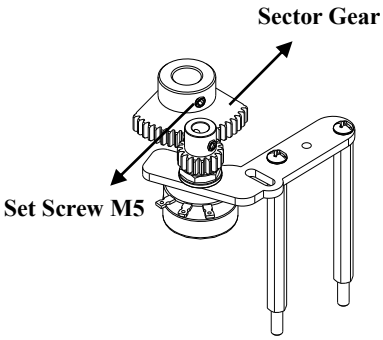
k. Supply the power to confirm that the limit switches achieve the fully open-close stroke.

l. When optioned with modulating control or potentiometer:
Supply power to run the actuator to the fully-closed position and tighten the set screw based on the actuator model listed below.

OM-A,OM-AM and OM-J	Rotate the round gear counter-clockwise to the end and tighten the M5 set screw.
OM-1	Rotate the round gear clockwise to the end and tighten the M5 set screw.
OM-2 to OM-13 OM-F, OM-G and OM-H	Rotate the sector gear clockwise to the end and tighten the M5 set screw.



【OM-1, OM-A, OM-A, and OM-J】



【OM-2 to OM-13, OM-F, OM-G, and OM-H】

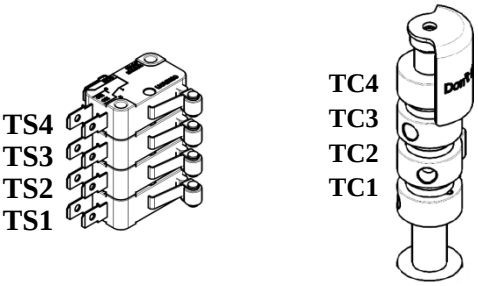
a. The setting procedure is now completed.

5. Torque Switch (Optional)

5.1 Instructions

The torque switch provides overload protection to prevent damage to the actuator due to torque overload. This option has been installed and calibrated before shipment from the factory, please do not adjust the torque limit setting value arbitrarily.

- The optional is with two torque switches (TS1 & TS2) and cams (TC1 & TC2). TS3 & TS4 can be added as feedback dry contacts.
  TS1 & TS2: TS1 is for open and TS2 is for close. They torque switch the open and closed travel range by provides torque overload protection.
  TS3 & TS4 are optional. They allow external equipment to confirm that the valve has reached the torque limit value arbitrary.



- Dry contact sequence diagram (TS3 & TS4)

Symbol	Contact	Torque: Overload (Open)	Torque: Overload (Close)
TS4 (Dry Contact)	COM-NC	——	----
	COM-NO	----------	——
TS3 (Dry Contact)	COM-NC	-----	——
	COM-NO	——	----------

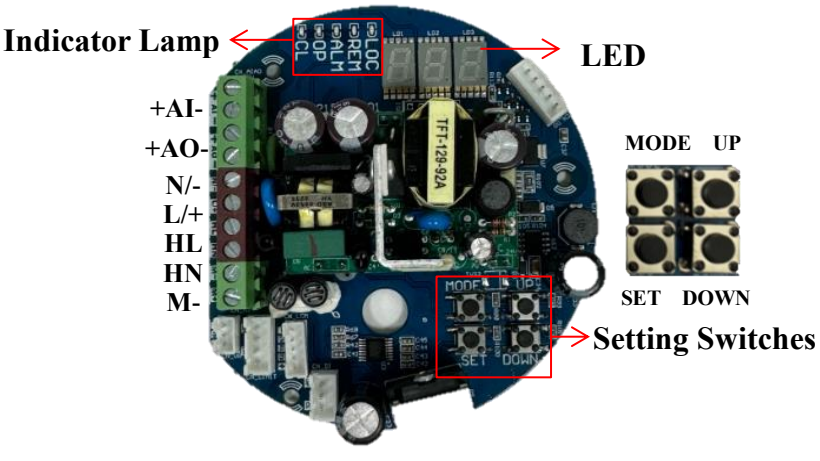
  - Solid line (——): Dry contact in conductive state.
  - Dotted line (-----): Dry contact in non-conductive state.

6. Modulating Control Board Adjustment

6.1 OM-1, OM-A & OM-AM Modulating Control Board and Modbus Board (Optional)

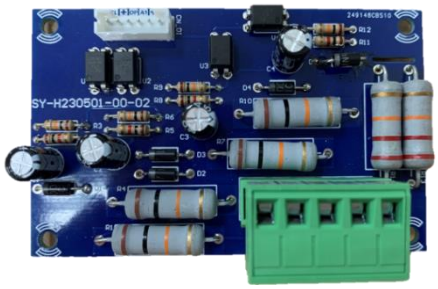
6.1.1 Surface Instruction

- **If the LED display is not operated for ten minutes, it will go out and return to the first level 999. 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)

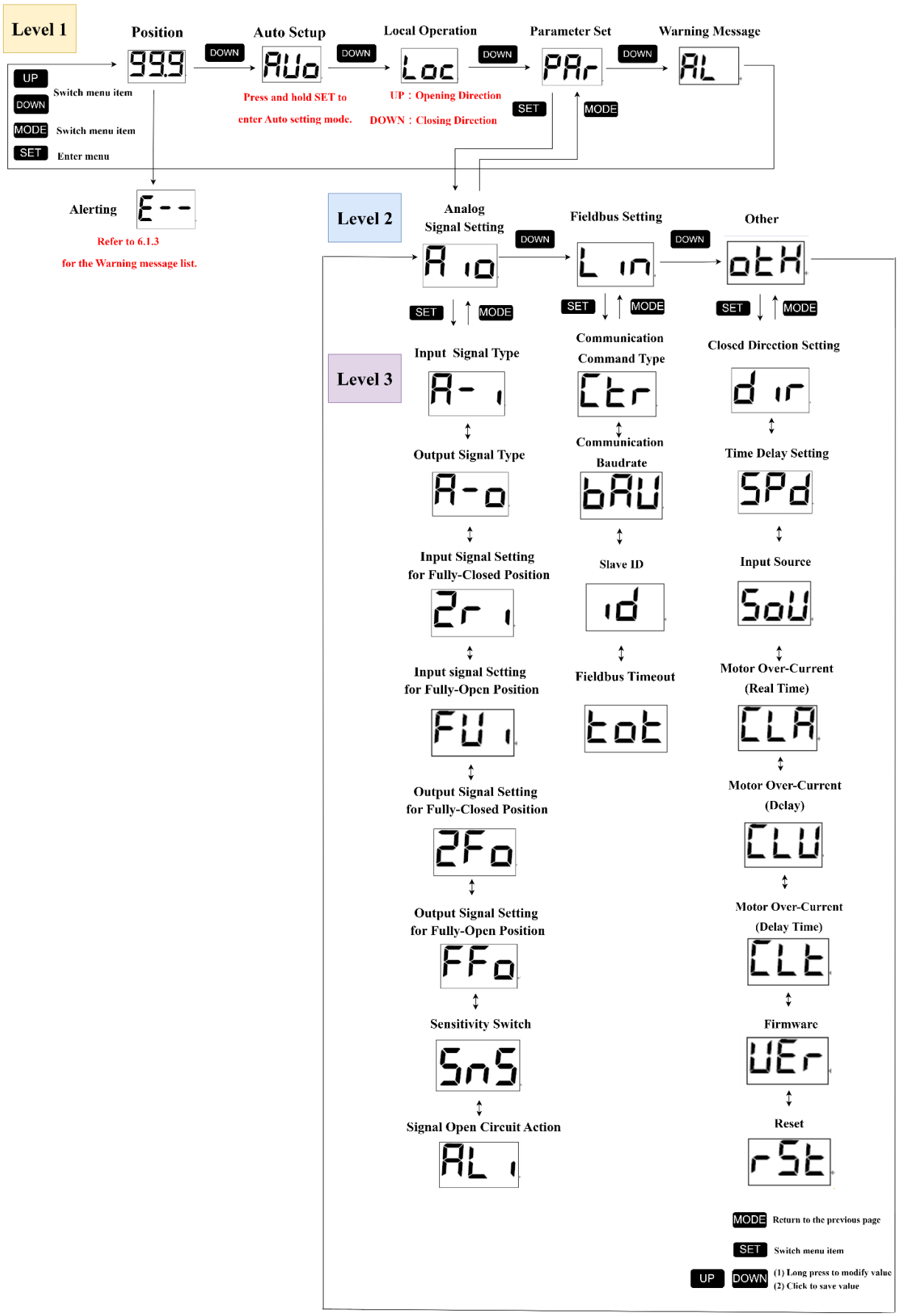
- **Lamp Status**

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 (+)

6.1.2 Settings Menu



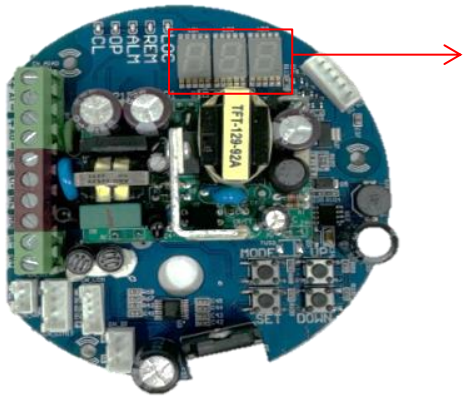
6.1.3 Position Percentage

➢ 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

6.1.4 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 6.1.6.3 (c) (P.36) to set the input mode SoU as required.
     - Refer to 6.1.6.1 (P.23~ P.30) for modulating mode.
     - Refer to 6.1.6.2 (P.31 ~ P.33) for Modbus mode.
     - No basic parameter settings are required for digital input mode.

6.1.5 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 operation and return to the previous menu.

6.1.6 Parameter Setting PAr

- Set the input mode SoU first (P.36), 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.

6.1.6.1. Analog Signal Setting (Modulating Control) A io

⚠ **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- I

- 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 io displays, then press “SET” once to enter analog signal setting.
  3. Press “UP” or “DOWN” until A- I 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 

- 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  displays, then press “SET” once to enter parameter setting.
  2. Press “UP” or “DOWN” until  displays, then press “SET” once to enter analog signal setting.
  3. Press “UP” or “DOWN” until  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 a signal of 4 mA, 1 V, or 2 V based on the setting of  , 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 a signal of 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

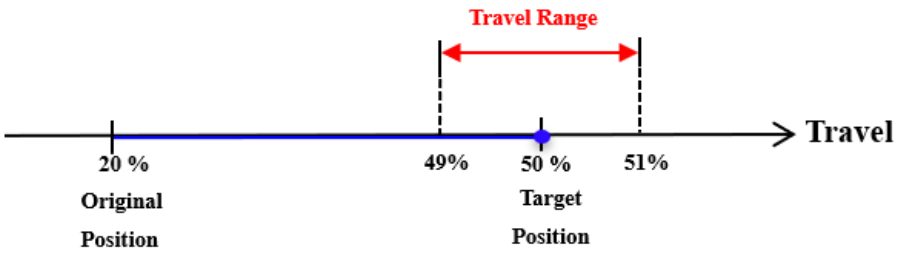
- Set the output signal value for fully- open position.
- Setting Range:000 to 4095.
  - ➢ The LED display is designed with hexadecimal format, so the value of 4095 is dislayed as FFF.
- Setting Steps:
  1. Press “DOWN” several times until PAr displays, press “SET” once to enter parameter setting.
  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 travel range will be from 49 % to 51 % as shown in the figure below.



- Default Setting:
  - OM-1, OM-A, OM-AM：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 AL1

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

  ⚠ **The function only available for the A-1 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 A10 displays, then press “SET” once to enter signal setting.
3. Press “UP or “DOWN” until AL1 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.

   ⚠ **When set to 000 or 001, if a signal open circuit occurs, the actuator will operate to close direction for 1 second before executing the setting function.**

6.1.6.2. Modbus Setting (Optional) L in

⚠ **Set the input mode setting SoU (P.36) 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.

6.1.6.3. Other oth

a. Close Direction Setting dir

- 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 dir 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.**

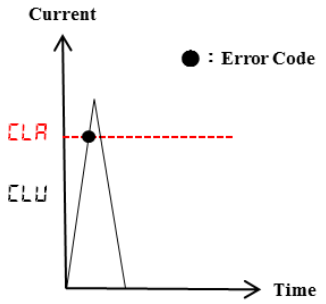
⚠ **If the input mode is changed, adjust the wiring according to the corresponding wiring diagram.**

- 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

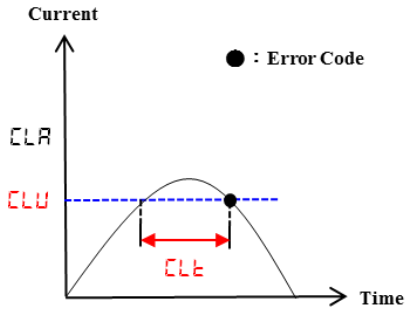
6. Press “SET” to complete the input mode setting.

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: 1.00
- 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. 10
- 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

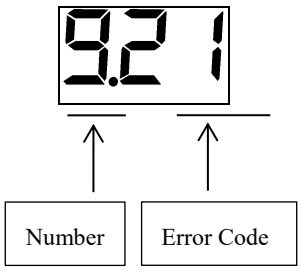
- Display the current firmware version.
- Checking Steps:
  1. Press “DOWN” several times until PAr displays, then press “SET” once to enter parameter setting.
  2. Press “UP” or “DOWN” until otH displays, then press “SET” once.
  3. Press “UP” or “DOWN” until UEr displays, then press “SET” to show the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



- 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.

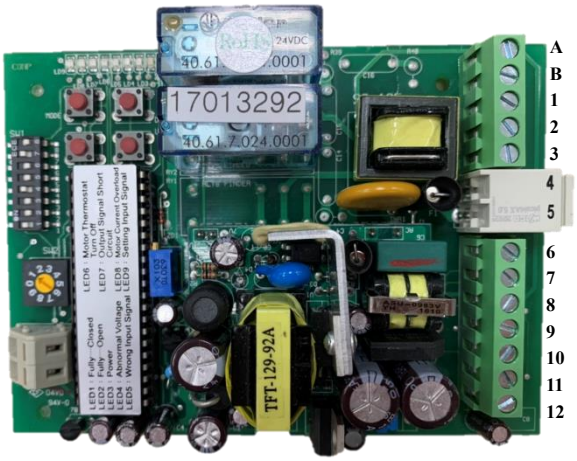
Error Code	Warning Message	Solution
17	Limit Position Fault	Refer to 4.4.2 (P.12 to P.17) for adjustment steps setting.
19	Digital Input Fault	Avoid inputting the “ON” digital signal for both open and closed control at the same time.
21	Input Signal Fault	Please set the correct input signal type.
22	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.

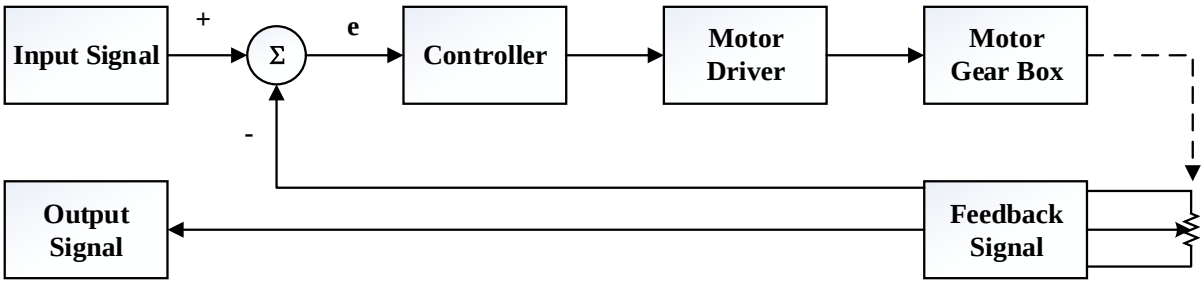
6.2 Modulating Control Board (OM-2 to OM-13, OM-F, OM-G & OM-H)

6.2.1 Surface

The layout is based on 110 / 220 V AC.



6.2.2 Programming

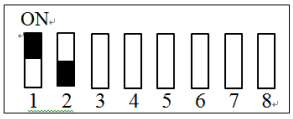


6.2.3 Dip Switch Setting (SW1)

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.

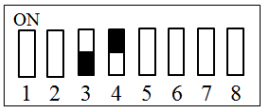
	1	2	3	4	5	6	7	8
Factory Setting	ON	OFF	OFF	ON	OFF	OFF	OFF	ON
4 - 20 mA input	ON	OFF						
1 - 5 V input	OFF	OFF						
2 - 10 V input	OFF	ON						
4 - 20 mA output			OFF	ON	OFF			
2 - 10 V output			ON	OFF	ON			
Closed direction setting: CW						OFF		
Closed direction setting: CCW						ON		
When signal 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

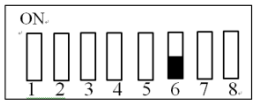
c. Close direction setting (switch 6)

- 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.**

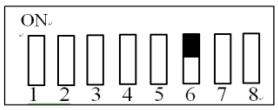
⚠ **The operating direction of the actuator has been set and calibrated at the factory. Be sure to change the direction of the position indicator if different operating direction is required.**

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

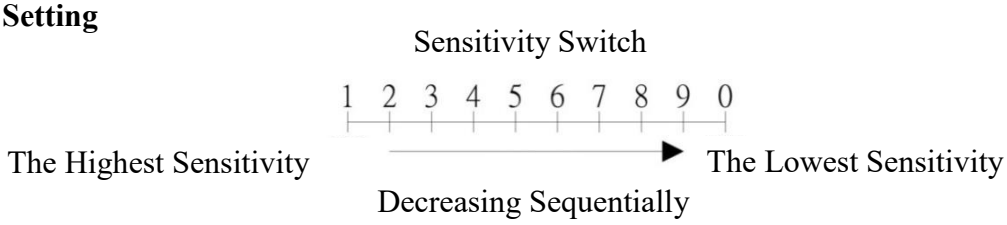
- The selection of the fail position while the input signal failed, please follow table below:

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

6.2.4 Sensitivity Switch Setting (SW2)

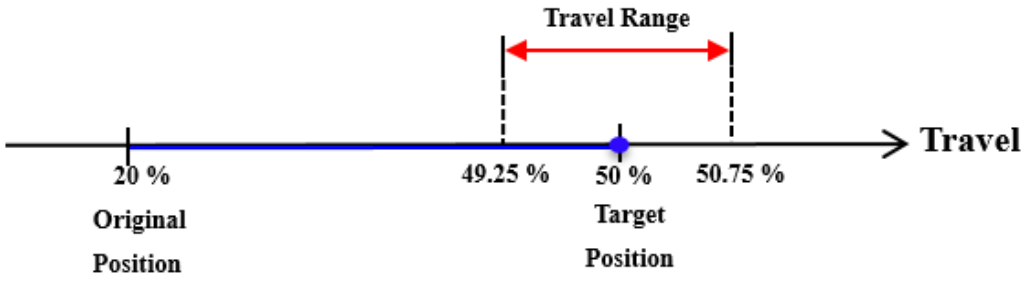
- When the sensitivity is higher, the resolution of the input signal will be higher, and relatively the dead band will be smaller. Excessive high resolution may cause the actuator to keep hunting and could not run to the desired position which will lead to the thermostat inside the motor to trip because 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 travel range will be from 49.25% to 50.75% (50% ± 0.75%) as shown in the figure below.



b. Original Factory Setting

- OM-2 to OM-13, OM-H : 3
- OM-F, OM-G : 0

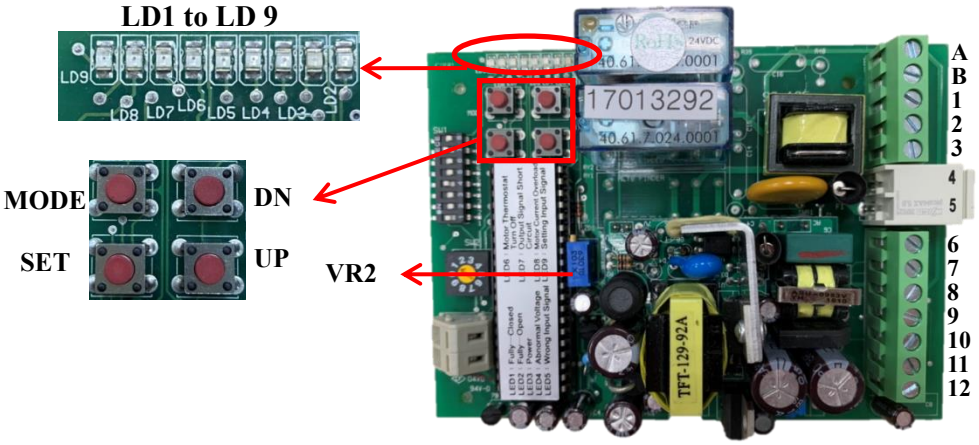
Model	Figure
OM-2 to OM-13, OM-H	
OM-F, OM-G	

6.2.5 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

6.2.6 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, please refer to 6.2 (P.42) 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 6.2.3 (P.43 - P.45).
LD6 goes on	Motor thermal protector started.	a. The duty cycle exceeded the rated, please refer to 3.5 (P.6). 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 6.2.3. (P.43 - P.45)
LD8 goes on	Motor over-current.	a. Duty cycle exceeded the rated, please refer to 3.5 (P.6) and 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.

6.3 OM-2 to OM-13, OM-F, OM-G, OM-H Modbus Modulating Control Board (Optional)

6.3.1 Surface

The layout is based on 110 / 220 V AC.

Duty Cycle 30%

Duty Cycle 75%

6.3.2 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.

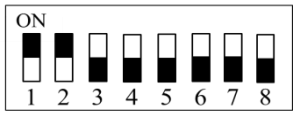
ⓘ **Please restart the actuator after adjusting.**

ⓘ **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.

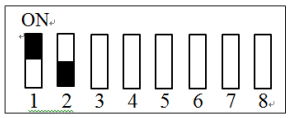


- **Modulating Control:**

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

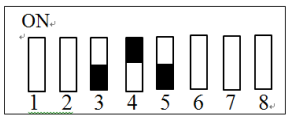
To enable Analog Modulation：

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)

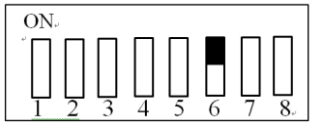


Output Signal	State of Switch
4 - 20 mA	3 at OFF, 4 at ON, 5 at OFF
2 - 10 V	3 at ON, 4 at OFF, 5 at ON

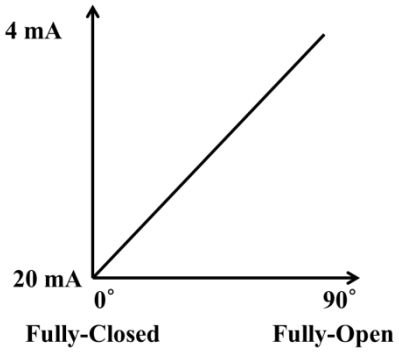
c. Setting of fail position when input signal fails (Switches 6 - 8)

⚠ **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.



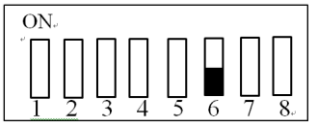
- When a low signal value received, the actuator operates toward fully-open position and when a high signal value received, the actuator operates toward fully-closed position.

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

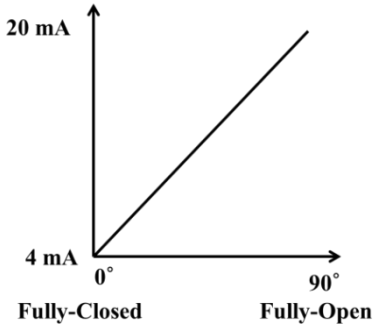
- The selection of the fail position while the input signal failed, please follow table below:

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.

6.3.3 Sensitivity Switch Setting (SR1)

- OM-2 to OM-13 and OM-H Factory setting:
  Select "MODBUS" control, the sensitivity is preset to 1.
  Select "analog signal" control, the sensitivity is preset to 7.

- OM-F and OM-G Factory setting:
  Select "MODBUS" control, the sensitivity is preset to 0.
  Select "analog signal" control, the sensitivity is preset to 0.

- When analog signal is selected:
  Switch to 1: the highest sensitivity.
  Switch to 0: the lowest sensitivity.

6.3.4 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

6.3.5 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.

6.3.6 Signal Setting

⚠ **If the travel end positions have not been set up properly per 6.3.5 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.

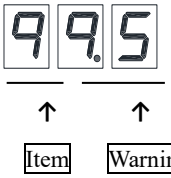
- **Output signal setting for fully-closed position**
  ⚠ **Use a multimeter to measure the output signal in accordance with the selected signal type.**
  a. Press “MODE” several times until [Io] displays, then press “SET” once to enter signal setting mode.
  b. Press ”UP” or ”DOWN” until [2Fo] displays.
  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.

6.3.7 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 (The latest data) 98 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**

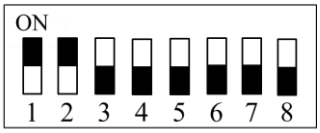
a. If you want to check the latest data, press “MODE” several times until AL displays → Press “Set” once → The LED display will show the latest data 99.

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.

6.3.8 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.

- **Setting station**
  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.**

6.3.9 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 100
9	Position feedback (%)	0 to 100

7. Troubleshooting

Floating Control

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 4.4.2 (P.12 - P.17).
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 3.5 (P.6).

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.

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 4.1 (P.9) valve installation instructions. b. Readjust the mechanical end stops and limit switches, please refer to 4.4.2 (P.12 - P.17). 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. b. PCBA failed. c. Wrong supply voltage.	a. Replace a new fuse. b. Replace a new PCBA. 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).

The actuator operates in the wrong direction

Possible problems	Solution
The wiring connection is abnormal.	1. Check if the phase sequence of three-phase voltage is correct. 2. Follow the wiring diagram inside the cover to connect the wires and check if the wiring is correct.

When communication fails.

Possible problems	Solution
Communication format error.	1. Check if the baud rate and station number are correct. 2. Ensure that the bus station numbers are not duplicated.

Modulating Control (OM-2 to OM-13, OM-F, OM-G & OM-H)

The LED indicators (LD4 - LD9) flash.

Solution
Please refer to 6.2.6 (P.48 - P.49).

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 6.2.3 (P.43 - P.45) or 6.3.2 (P.51 - P.35).
c. Modulating board failed and causes actuator cannot operate or only operate in a single direction	c. Replace a new modulating board.

8. 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.

9. Disposal

Please obey the local environment regulation for equipment scrapping.

SUNYEH ELECTRICAL IND. CO.,LTD.

No.68, Ln. 854, Sec. 1, Shatian Rd., Dadu Dist.,
Taichung City 432, Taiwan
Tel: +886-4-26985666 Fax: +886-4-26983668
E-mail: service@sunyeh.com

www.sunyeh.com