CAUTION !

- **Please ensure that the O-ring seal is in good condition prior to cover installation.**
- **Installation, maintenance and repair works must be performed by trained personnel.**
- **The actuator is equipped with a manual device, please refer to the operating manual 4.1 Manual operation instruction (P.9). Do not use any tools other than wrench to increase opening / closing torque (Max torque: 1.9 Nm) as this can damage the actuator or valve.**

Installation Notices

a. Please read operation manual and wiring diagram carefully before installation.
b. 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.
c. Turn power off before wiring or maintenance.
d. Connect the ground wire to PE point inside the electric actuator.
e. To avoid functional failure caused by static, do not touch any components on the PCB with metal tools or bare hands.
f. 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.
g. Actuator should be installed in an upright or horizontal position. Do not mount upside down or below a horizontal position.
h. These units are not designed to operate in vacuum spaces or where an explosive atmosphere exists.
i. Periodically inspect actuator enclosure to prevent dust from accumulating.
j. Please obey the local environment regulation for equipment scrapping.

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 when calculating the torque requirement. Refer to the example below).

- If the maximum torque of 1" valve is 10 Nm.

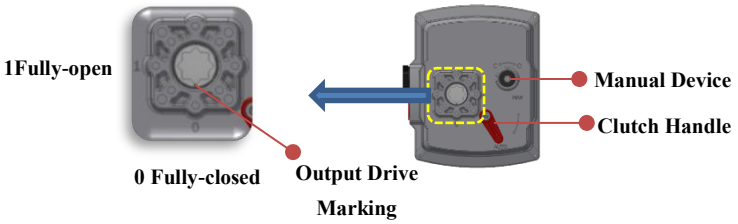
  → 10 × 1.3 (safety factor) = 13 Nm
  13Nm < 20 Nm (DM-20) → OK!

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.

Valve Mounting Instructions

Make sure both the valve and actuator are in the same position before mounting, either fully-open or fully-closed. If not, switch the clutch handle from electrical operation (AUTO) to manual operation (MAN). Use a 6 mm open-end wrench to rotate the manual device (Max. torque: 1.9 Nm) to align the output drive marking with either 0 (fully-closed) or 1 (fully-open) mark on the base. Then, mount the actuator with the valve. Switch the clutch handle back to electrical operation (AUTO). For example: The actuator is in fully-open position and the valve is in fully-open position as well.

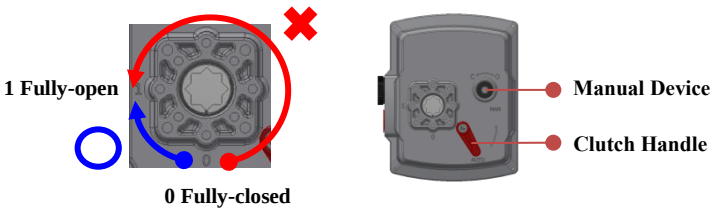
⚠ **If mounted with damper, mount the damper with actuator in closed position first, then readjust the angle of open position.**



a. 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.**
b. Check again that the valve and actuator are in the same position.
c. 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.**
d. Refer to operating manual section 3.7 (P.8) for wiring instructions and connect the wires according to the wiring diagram labeled inside the cover of actuator.
e. Supply power to actuator.
⚠ **Care must be taken at all times as there are live circuits present that may cause electrical shock.**
f. 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.**

Manual Operation

a. Switch the clutch handle from electrical operation (AUTO) to manual operation (MAN).
b. Use a 6 mm open-end wrench (max. torque 1.9 Nm) to rotate the manual device either clockwise to open (O) or counter-clockwise to close (C).
⚠ **This is demonstrated by viewing from the bottom of the output drive.**
c. After manual operation, please switch the clutch handle from manual operation (MAN) to electrical operation (AUTO).
⚠ **After manual operation, switch to electrical operation (AUTO) to enable motorized actuator, otherwise the actuator will not operate properly.**



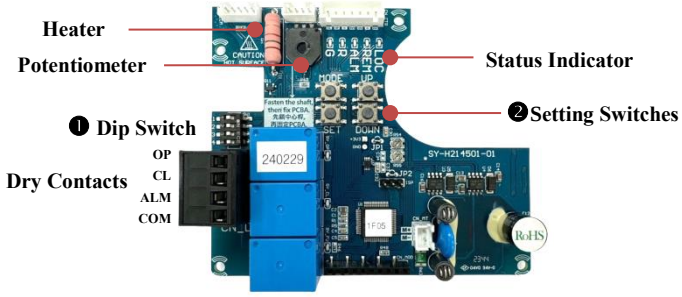
- During manual operation, the blue arrow indicates the normal range of output drive rotation. If the output drive rotation falls within the range marked by the red arrow, it indicates exceeding the fully-open or fully-closed limit positions, and the LED indicator will display E45 (4 long flashes and 5 short flashes) or E46 (4 long flashes and 6 short flashes) in yellow. Refer to 4.2 LED Status / Alarm Indication (P.10) and 6 Troubleshooting (P.33 to 35) for more information.

LED Status / Alarm Indication

- In addition to providing the current operating status as shown in the table below, when the LED status / alarm indicator flashes in yellow, the length and frequency of the flashes represent different warning messages. Refer to 5.3.6 Troubleshooting Error Code (P.30 to p.31) for more information.
  For example, when the LED indicator displays 2 long flashes and 1 short flash in yellow, the error code is 21.
- The following table shows actuator status when the dip switch S1 to S4 is set at OFF.

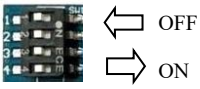
Lamp Status	Actuator Status
Red On	Fully-open
Red Light Flashing	Opening Direction
Green On	Fully-closed
Green Light Flashing	Closing Direction
Yellow On	Stop at Intermediate Position
Yellow Light Flashing	Fault

PCBA Setting - Master Control Board



Lamp Code	Lamp Color	Actuator Status	
		S2 OFF	S2 ON
G		Light on: Fully-closed Flashing: Closing Direction	Light on: Fully-open Flashing: Opening Direction
R		Light on: Fully-open Flashing: Opening Direction	Light on: Fully-closed Flashing: Closing Direction
ALM		Alerting Signal	
REM		Remote Control Mode	
LOC		Local Control Mode	

❶ Dip Switch Setting (SW1) (Original Factory Setting：1, 2, 3, 4 OFF)



S1: Supercapacitors Fail-safe Direction

Setting	Output drive operating direction when power is lost
OFF	CW
ON	CCW

S2: Indicator Color of Open / Closed Direction

Setting	Opening direction	Closing direction
OFF	Red	Green
ON	Green	Red

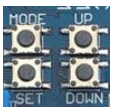
⚠ **The adjustment of S2 only affects the color of LED status / alarm indicator.**

S3: Closing Direction Definition

Setting	Output drive operating direction during closing direction
OFF	CW
ON	CCW

⚠ **The position indicator is set per S3 setting at factory. Please readjust the position indicator accordingly if the setting of S3 has been changed.**

❷ Fully-open and Fully-closed Limit Position Setting



⚠ **Use setting switches to readjust the fully-open and fully-closed limit position if needed.**

a. Press and hold “SET” for 3 seconds until “LOC” lamp comes on and “REM” lamp comes off to enter setting mode. Press the “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.

b. Fully-CLOSED Limit Position Setting
- Press and hold “DOWN” to operate the actuator to desired fully-closed position and press “MODE” for 3 seconds until fully-closed indicator lights on to complete the setting of fully-closed limit position.
  ※ The indicator color is set according to the dip switch S2, and the factory default setting for the closed direction is green.

c. Fully-OPEN Limit Position Setting
- Press and hold “UP” to operate the actuator to desired fully-open position and press “MODE” for 3 seconds until the fully-open indicator lights on to complete the fully-open limit position setting.
  ※ The indicator color is set according to the dip switch S2, and the factory default setting for the open direction is red.

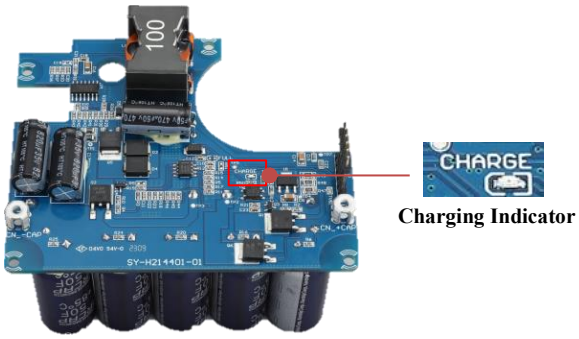
d. Press ”SET” once until “REM” lamp comes on and “LOC” lamp comes off to quit local control setting.

PCB Setting - Capacitor Board

⚠ **Power must be off before installing or removing the module to avoid danger.**

➢ Function: Supercapacitors are used to supply power to operate the dampers or valves to safe position (fully OPEN or CLOSED) when power is lost.
- ■ Pre-charging time: 5 minutes (24 V DC power at 25°C).
- ■ Supercapactors are charged in line power, and are used to operate the actuators to the fail-safe position when power is lost.
- ■ The charging indicator remains on when a capacitor board is charging and turns off when the charging is completed.

➢ Capacitor lifespan:
- ■ The lifespan is 160,000 hours at ambient temperature 25°C.
- ■ The lifespan is 14,000 hours at ambient temperature 60˚C.

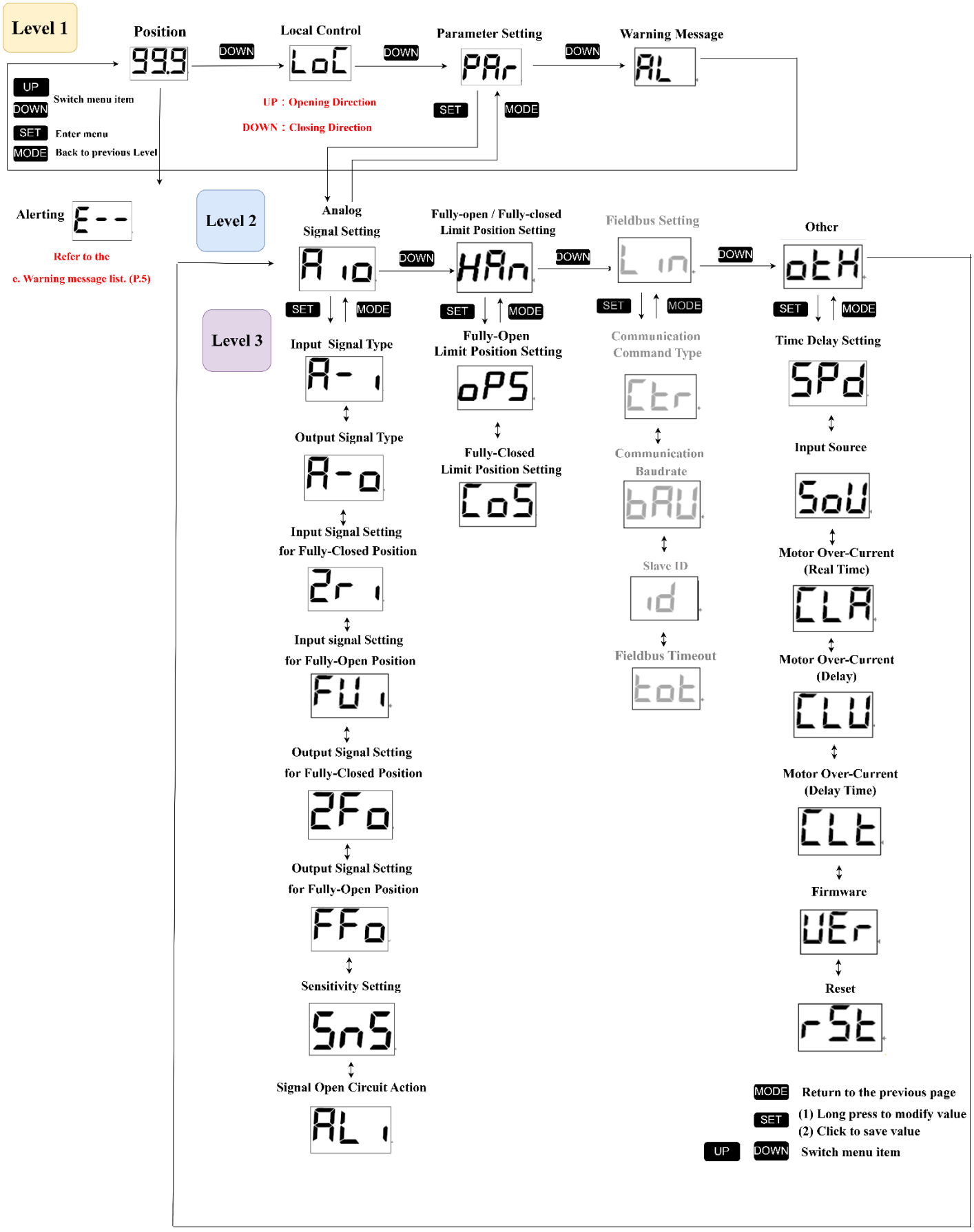


Charging Indicator

PCB Setting - Modulating board Settings Menu

- Please refer to the operation manual for complete settings.

⚠ **The Communication Settings function is currently unavailable. It will be available in later version.**

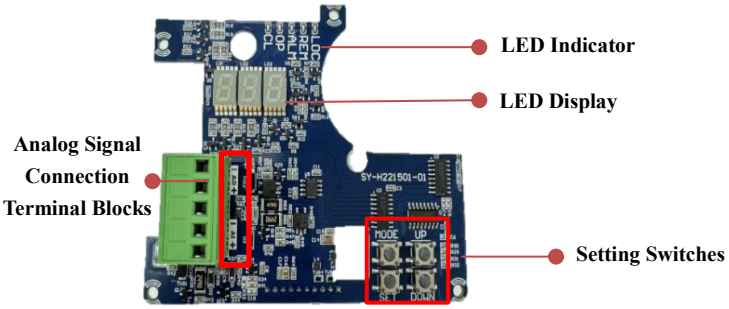


PCB Setting - Modulating Board

⚠ **Power must be off before installing or removing the module to avoid danger.**

⚠ **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.**

⚠ **Please refer to operation manual 5.3.5 (P.18) for parameters setting when installing the modulating board.**



- **Analog Signal Connection Terminal Blocks**

Terminal	Status
AO -	Analogue Signal Output (-)
AO +	Analogue Signal Output (+)
	N/A
AI -	Analogue Signal Input (-)
AI +	Analogue Signal Input (+)

- **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

- **Parameter Setting** PAr
  - Signal and other parameters setting.

  [Analog Signal Setting] AIo

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

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

  a. Input signal type AI-
  - Input signal type setting.
  - Factory 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 AIo displays, then press “SET”once to enter analog signal setting.
    3. Press “UP” or “DOWN” until AI- displays, then press “SET”once to enter 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

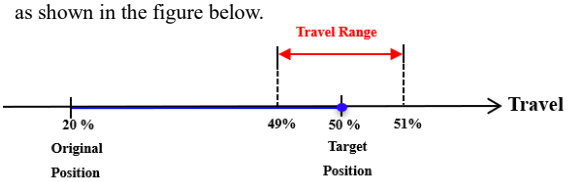
    6. Press “SET” once to complete input signal type setting.

  b. Output Signal Type AO-
  - 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 AIo displays, then press ”SET” once to enter analog signal setting.
    3. Press “UP” or “DOWN” until AO displays, then press “SET” once to enter output signal type 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. Press “SET” once to complete output signal type setting.

  c. 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: 1.0%.
  - Setting Steps:
    1. Press “DOWN” several times until PAr displays, then press “SET” once to enter parameter setting.
    2. Press “UP” or “DOWN” until AIo 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 setting value.
    6. Press “SET" to complete the sensitivity setting.

d. Signal Open Circuit Action AL1

- Action when the input signal fails.

⚠ **This function is only available when the input signal type A-1 is set to 4 - 20 mA, 1 - 5 V or 2 - 10 V.**

- Setting Range: 000 to 002

Parameter Code	Instruction
000	Stay at the last positon when input signal fails.
001	Run to the fully-open positon when input signal fails.
002	Run to the fully-closed positon when input signal fails.

- Default Setting: 002
- 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 1O displays, then press “SET” once to enter analog 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.

〔Fully-open / Fully-closed Limit Position Setting〕 HAn

⚠**This function is the same as section 5.1.3 Signal Setting for fully-open and fully-closed limit position of master control board. Repeat the setting is not required if it is completed.**

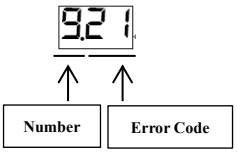
a. **Fully-Open Limit Position Setting** oPS

- Setting Steps:
  1. Press “DOWN” several times until PAr displays, then press “SET” once to enter parameter setting.
  2. Press “UP” or “DOWN” until HAn displays, then press “SET” once to enter Fully-open / Fully-closed Limit Position Setting.
  3. Press “UP or “DOWN” until oPS displays, then press “SET” once. “LOC” lamp will light on and the “REM” lamp will light off.
  4. Press “UP” and “DOWN” 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.
  5. Press and hold “UP” to operate the actuator until it has reached fully-open position. Press and hold ”SET” until “REM” lamp lights on and the “LOC” lamp lights off to complete the fully-open limit position setting.

b. **Fully-Closed Limit Position Setting** CoS

- Setting Steps:
  1. Press “DOWN” several times until PAr displays, then press “SET” once to enter parameter setting.
  2. Press “UP” or “DOWN” until HAn displays, then press “SET” once to enter Fully-open / Fully-closed Limit Position Setting.
  3. Press “UP or “DOWN” until CoS displays, then press “SET” once.“LOC” lamp will light on and “REM” lamp light off.
  4. Press “UP” and “DOWN” 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.
  5. Press and hold “DOWN” to run the actuator until it has reached fully-closed position. Press and hold ”SET” until “REM” lamp lights on and the “LOC” lamp lights off to complete the fully-closed limit position setting.

e. Warning Messages AL



- Press “UP” or “DOWN” to switch the number from 0 to 9.
- Press and hold “SET” to clean all the error data.
- Press “MODE” 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
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 are connected correctly. (“ AO-”to “ AO+”).
23	Flash Memory Module and Operating Status Error	Replace a new master control board.
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 operating manual 5.3.5 (P.24) for sensitivity setting.
32	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.
33	CLOSE Potentiometer Fault	Confirm that if the torque is overloaded or the motor is locked. If this problem cannot be solved, please contact the seller.
34	Abnormal Current for Open direction	Use the manual device to check if the valve is stuck by foreign objects and remove them.
35	Abnormal Current for Closed direction	Use the manual device to check if the valve is stuck by foreign objects and remove them.
38	Signal Open Circuit	Check if the input signal is connected or not.
42	High Input voltage	1. Confirm the supply power. 2. Replace a new power board.
43	Power Failure	The actuator will run to a fail-safe position powered by a capacitor board when power is lost. Please check if the power supply is normal.
44	Capacitor Charging Abnormally	Replace a new capacitor board.
45	Exceeding the fully-open limit position during manual operation.	Refer to 4.1 manual operation instructions and manually or electrically operate the actuator to the fully-open limit position.
46	Exceeding the fully-closed limit position during manual operation.	Refer to 4.1 manual operation instructions and manually or electrically operate the actuator to the fully-closed limit position.