DynaQuip®
DYNAMIC FLUID CONTROL SYSTEMS

MA4 Series

Modulating Electric Actuator Guide

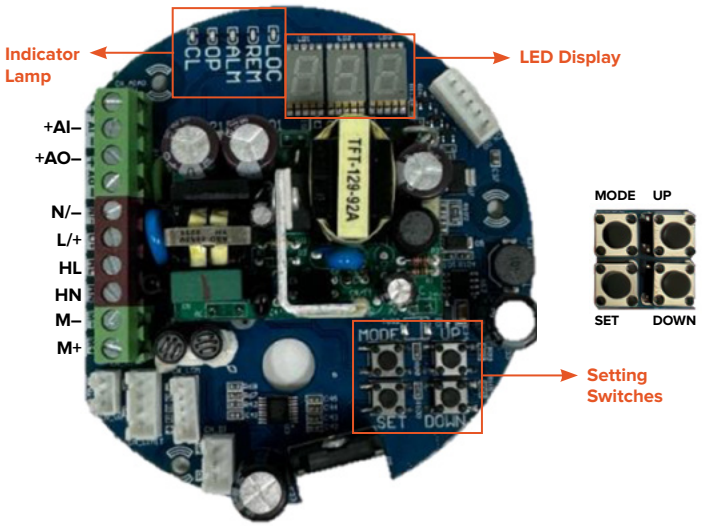
To order or for additional information, **visit dynaquip.com or call 800-545-3636.**

MA4 (all voltages) Modulating Control Board

6.3.1 Surface Instruction

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

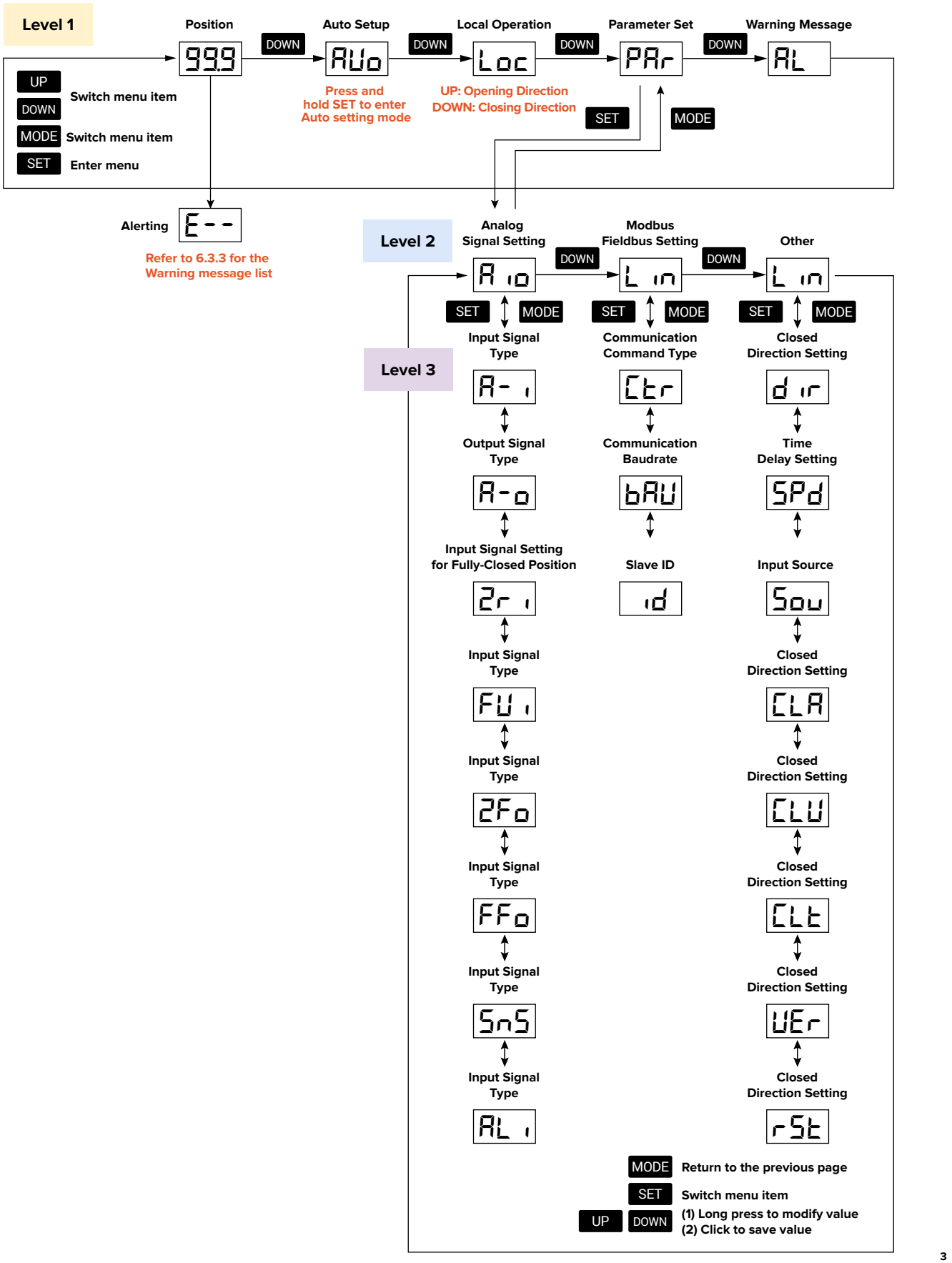
Modulating Control Board



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

6.3.2 Settings Menu



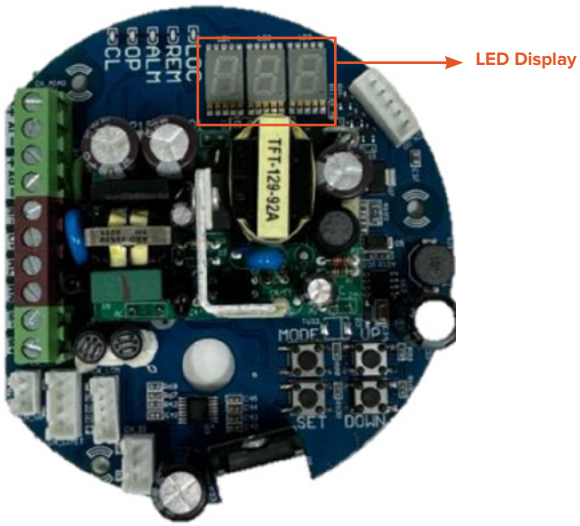
6.3.3 Position Percentage

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

6.3.4 Auto Setup AUo

Prior to Auto setup, please refer to 6.3.6 (P.35 to P.36) to complete the setting of analog input and analog output signal types.

Be sure to reset OPEN and CLOSE position according to the following steps after recalibrating fully-open and fully-closed position or any signal type setting.

- 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 seconds 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.

6.3.5 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 amp 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 remote control mode.

6.3.6 Parameter Setting PAr

- Signal and other parameters setting.

Analog Signal Setting A io

Use a multimeter to 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 seconds 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 seconds 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 analog input signal type setting.

c. Input signal setting for fully-closed position Zr1

- Set the input signal value for fully-closed position.
- Setting Range: 000 to 4095
  - ➔ The LED display is designed with hexadecimal format, so the value of 4095 is dislayed as FFF.
- Setting Steps:
  1. Press **DOWN** several times until PAr displays, then press **SET** once to enter parameter setting.
  2. Press **UP** or **DOWN** until A10 displays, then press **SET** once to enter analog signal setting.
  3. Press **UP** or **DOWN** until Zr1 displays, then press **SET** once to enter input signal setting for fully-closed position.
  4. Press and hold **SET** around 3 seconds until the display shows the value and flashes.
  5. Use a signal generator to output Input a signal of 4 mA, 1 V, or 2 V based on the setting of A-1, then press **SET** once to complete the input signal setting of fully-closed position.

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

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

d. Input signal setting for fully-opened 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** once to enter input signal setting for fully-open position.
  4. Press and hold **SET** around 3 seconds until the display shows the value and flashes.
  5. Use a signal generator to output 20 mA, 5 V, or 10 V based 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 dislayed as FFF.
- Setting Steps:
  1. Press **DOWN** several times until PAr displays, then press **SET** once to enter parameter setting.
  2. Press **UP** or **DOWN** until A 10 displays, then press **SET** once to enter analog signal setting.
  3. Press **UP** or **DOWN** until 2Fo displays, then press **SET** once to enter output signal setting for fully-closed mode.
  4. Press and hold **SET** around 3 seconds 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

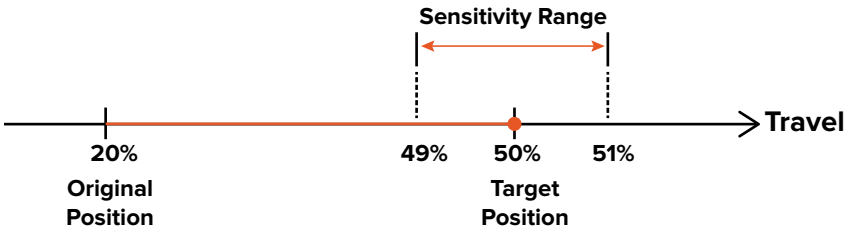
- Set the output signal value for fully-open position.
- Setting Range: 000 to 4095
  - ➔ The LED indicator is displayed in hexadecimal format, so the value of 4095 is displayed as FFF.
- Setting Steps:
  1. Press **DOWN** several times until PAr displays, then press **SET** once to enter parameter setting.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

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

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

g. Sensitivity Setting SnS

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



- Default Setting:
  - MA4 (all voltages): 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 seconds until the display shows the value and flashes.
  5. Press **UP** or **DOWN** to adjust the sensitivity switch setting.
  6. Press **SET** to complete the sensitivity switch setting.

h. Signal Open Circuit Action AL i

- Action mode when the input signal fails.

The function only available for the AL i setting of 4 - 20 mA, 1 - 5 V and 2 - 10 V.

- Setting Range: 000 to 002

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

- Default Setting: 002
- Setting Range:

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 signal setting.
3. Press **UP** or **DOWN** until AL 1 displays, then press **SET** once to enter signal open circuit action mode.
4. Press and hold **SET** around 3 seconds 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

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, 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 dir displays, then press **SET** once.
4. Press and hold **SET** around 3 seconds 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.

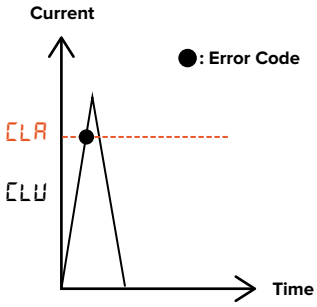
b. Time Delay Setting SPd

- 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, then press **SET** once to enter parameter setting.
  2. Press **UP** or **DOWN** until oEH displays, then press **SET** once to enter signal setting.
  3. Press **UP** or **DOWN** until SPd displays, then press **SET** once.
  4. Press and hold **SET** around 3 seconds 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.

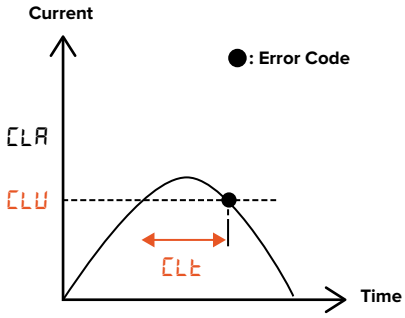
  6. Press **SET** to complete the time delay setting.

c. 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: 130
- Setting Steps:
  1. Press **DOWN** several times until PAr displays, then press **SET** once to enter parameter setting.
  2. Press **UP** or **DOWN** until OEH displays, then press **SET** once.
  3. Press **UP** or **DOWN** until CLA displays, then press **SET** once.
  4. Press and hold **SET** around 3 seconds 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.

d. 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: 100

- 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 CLU displays, then press **SET** once.
  4. Press and hold **SET** around 3 seconds 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.

e. 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 seconds
- Default Setting: 010
- 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 to enter signal setting.
  3. Press **UP** or **DOWN** until CLt displays, then press **SET** once.
  4. Press and hold **SET** around 3 seconds until the display shows the value and flashes.
  5. Press **SET** to set delay time.
  6. Press **SET** once to complete the delay time setting for motor over-current.

f. 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.

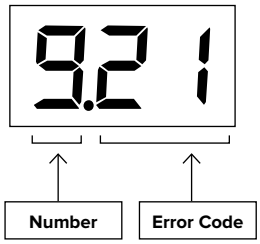
g. Restore Default Settings rSt

- 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 seconds 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** to restore default settings.

Press MODE to return to the previous level if is not required.

6.3.7 Troubleshooting



- 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 Switch Fault	Refer to the MA Series IOM for adjustment steps.
19	Digital Input Fault	Please exclude that the input on/off signals are ON 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 are connected correctly. (“ AO-”to “ AO+”)
23	Flash Memory and Operating Status Fault	Replace a new modulating 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 6.3.6 (P.10) 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	Operate the handwheel to confirm if the valve is stuck by foreign objects.
35	Abnormal Current for Closed Direction	Operate the handwheel to confirm if the valve is stuck by foreign objects.
38	Signal Open Circuit	Check if the input signal is connected or not.