

BMA-M0

User Manual

V1.00

Function Overview

This product is designed for integrated control of compact electric actuators. It realizes on-off control of the actuator via external 4–20 mA analog signals or fieldbus. Built-in comprehensive protection circuits inside the actuator ensure stable system operation.

1.Main Technical Features

1. Input Voltage:

Single-phase AC $220V \pm 20\%$ 50/60Hz

2. Position detection adopts advanced absolute encoder with no dead zone.

3. Local key operation and digital tube display are supported.

4. Menu categories are subdivided in greater detail with user-friendly logic for easy commissioning.

5. Analog signal input: 4-20mA

6. Analog signal Output: 4-20mA

7. Drive Output: Silicon controlled rectifier (SCR) zero-crossing control output to suppress switching harmonics.

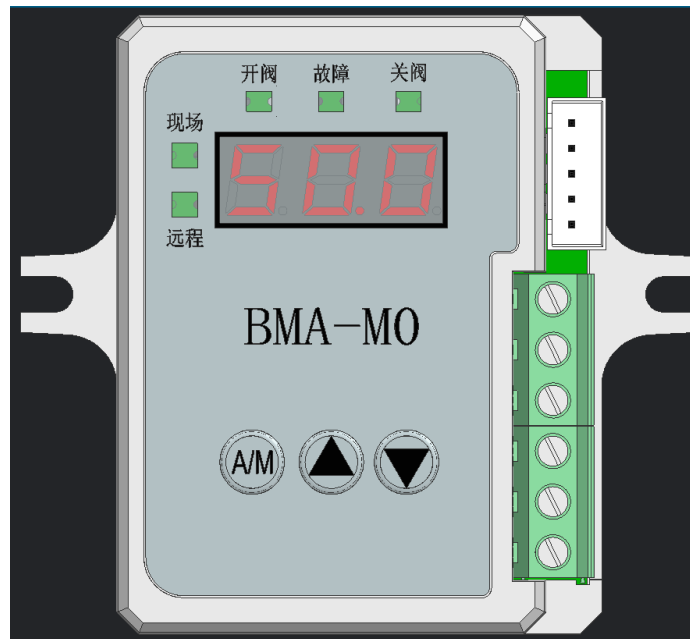
8. Working Temperature Range: $-30^{\circ}\text{C} \sim 70^{\circ}\text{C}$

Performance Indicators	
Contents	Indicators
Power Supply	Single-phase two-wire system AC $220V \pm 20\%$ 50/60Hz
Input Signal	Analog: 4-20mA DC Input Impedance 250Ω Fieldbus: Modbus and other industrial buses
Output Signal	Analog: 4-20mA DC Output Impedance $\leq 600\Omega$ Fieldbus: Modbus and other industrial buses
Dead Band Adjustment	0.1% ~ 9.9% adjustable

EMC indicators	Conforms to GB/T 17626 standards
Working Temperature Range	-30°C~70°C
Installation Direction	Any Direction

Note1: If you have requirements for other performance indicators, please contact us for discussion, and we will meet your technical demands as soon as possible.

2.Key & Display Introduction



2.1 Key Introduction

2.1.1 Key

In running interface:

Short press this key to switch between local mode and remote mode.

Long press this key to enter the parameter selection interface.

In parameter selection interface:

Short press this key to enter the parameter value display interface.

Long press this key to return to the running interface.

In parameter value display interface:

Short press this key to enter the parameter value editing interface.

Long press this key to return to the parameter selection interface.

In parameter value editing interface:

Short press this key to save modified parameter values and return to the parameter value display interface.

Long press this key to exit editing without saving changes and return to the parameter value display interface.

2.1.2 Key

On the running interface under local mode:

Short press this key to open the valve; if valve closing is in progress, short press this key to stop valve movement.

On the parameter selection interface:

Short press this key to switch selected parameters.

On the parameter value display interface:

This key is inactive.

On the parameter modification interface:

Short press this key to increase the parameter value.

When confirming parameter modification at the open/close position, short press this key to open the valve; if valve closing is underway, short press this key to stop valve action.

2.1.2 Key

In running interface under local mode:

Short press this key to close the valve; short press to halt valve opening if the valve is opening.

In parameter selection interface:

Short press this key to change the selected parameter.

In parameter value display interface:

This key has no function.

In parameter value editing interface:

Short press this key to decrease the parameter value.

When confirming parameter modification at the switch position, short press this key to close the valve; short press to stop valve opening if the valve is opening.

2.2 Display Introduction

The actuator adopts a 3-digit seven-segment display together with five LED indicators for presenting actuator status and parameter data.。

2.2.1 Digital Tube Display

In normal operation mode, the seven-segment display shows the valve opening position.

When an alarm is triggered, the display presents the current alarm code.

During parameter configuration, it displays the current parameter value and the value being modified.

2.2.2 LED Indicators

Valve Open LED: flashes during valve opening; stays steadily lit when fully open.

Fault LED: keeps lit to indicate an alarm exists.

Valve Close LED: flashes during valve closing; stays steadily lit when fully closed.

Local LED: lights up when the actuator is under local control mode, allowing valve opening/closing via local keys.

Remote LED: lights up when the actuator is under remote control mode; valve actions can be controlled by analog current signal or fieldbus command.

3、Parameter Introduction

3.1 Parameter Setting Operation

Under local mode, long press "  " key for more than 2 seconds to enter the parameter selection interface.

On the parameter selection interface, short press "  " key to enter the current parameter value display interface, where the value of the selected parameter will be displayed.

On the parameter selection interface, long press "  " key for 2 seconds to exit and return to the main running interface.

On the parameter value display interface, short press "  " key to enter the parameter editing interface, and the editable parameter value will blink on the screen.

On the parameter value display interface, long press "  " key for 2 seconds to exit back to the parameter selection interface.

On the parameter editing interface, short press " " key to save the modified value and return to the parameter value display interface.

On the parameter editing interface, long press " " key to discard changes without saving and return to the parameter value display interface.

参数修改界面下, 按" " 和 " " 按键来修改当前参数值

参数修改界面下, 同时参数在关位确认和开位确认界面下,

按" " 和 " " 按键来进行开关停阀门到全开全关位置来标定全开全关位。

On the parameter editing interface, use the " " and " " keys to adjust the parameter value up and down.

When staying at the fully-open position confirmation or fully-closed position confirmation page during parameter editing, operate " " and " " keys to open, close or stop the valve, so as to calibrate the fully-open and fully-closed positions of the valve.

3.2 Parameter Introduction

Parameter Code	Parameter Name	Default Value	Range
P00	Fully Closed Calibration	XXX	XXX
P01	Fully Open Calibration	XXX	XXX
P02	Signal Loss Action	Hd-Hold	Hd- Hold /0%-100%
P03	Control Dead Zone	1.5%	0.1%-9.9%
P04	Stall Protection	6S	3S-30S

	Time		
P05	Ref Polarity	P-Positive	P-Positive n-Negative
P06	Low Level Ref Signal Calibration	4.00mA	2.00mA-6.00mA
P07	High Level Ref Signal Calibration	20.00mA	18.00mA- 22.00mA
P08	Feedback Polarity	P- Positive	P-Positive n-Negative
P09	Low Level Feedback Signal Calibration	100.0%	80.0%-120.0%
P10	High Level Feedback Signal Calibration	100.0%	80.0%-120.0%
P11	Close Direction	ss- Clockwise	ss- Clockwise / ns- Counterclockwise
P12	Brake Time	10ms	0ms-150ms
P13	Remote Enable Flag	ON-	OFF / ON
P14	Encoder Direction	P-Positive	P- Positive / n-Negative
P15	Local Jog / Hold Mode	Hd-Hold	nHd-Jog/ Hd-Hold
P16	Encoder Type	0- Magnetic Encoder	0- Magnetic Encoder / 1- Potentiometer
P17	Automatic Control Type	0- Current Ref Control	0- Current Ref Control / 1- Fieldbus Control
P18	Slave Address	1	1-254
P19	Baudrate	3-9600bps	0-1200bps 1-2400bps 2-4800bps

			3-9600bps 4-19200bps 5-38400bps 6-115200bps
P20	Parity	n-None	n-None E-Even O-Odd
P21	Comm Timeout Time	10S	1S-60S

3.3 Parameter Description

3.3.1 P00- Fully Closed Calibration

This parameter is used to calibrate the fully closed stroke position of the valve. While the valve is stationary, press the "  " key to close the valve until it reaches the fully closed position, then press the "  " key to halt valve movement. Briefly press the "  " key to store the fully closed position, completing parameter configuration.

3.3.2 P01- Fully Open Calibration

This parameter is used to calibrate the fully open stroke position of the valve. With the valve in stationary status, press the "  " key to open the valve until it reaches the fully open position, then press the "  " key to stop the valve movement. Briefly press the "  " key to store the fully open position, and the parameter setting is finished.

3.3.3 P02- Signal Loss Action

This parameter takes effect under remote analog mode or remote bus mode.

In remote analog mode, the actuator generates alarm E06 (Setpoint Loss) when the set current is lower than 2mA, and executes corresponding actions after signal loss according to this parameter.

"Hold Position" means maintaining the original valve position; values ranging from 0% to 100% represent that the actuator will travel to the designated position once signal loss occurs.

In remote bus mode, once alarm E07 (Bus Fault, bus communication disconnection) is triggered, the actuator performs actions determined by this parameter.

"Hold Position" retains the current valve position, while 0%–100% settings command the actuator to move to the appointed position upon communication loss.

3.3.4 P03- Control Dead Zone

This parameter works under the remote analog mode. In this control mode, the actuator calculates the target valve position demanded by users according to the input set current, then compares the target position with the actual current valve position. The actuator will start to operate only when the absolute value of their difference exceeds the set dead zone value.

Note 1: Proper dead zone setting can prevent the actuator from oscillating around the target valve position.

3.3.5 P04- Stall Protection Time

When the actuator opens or closes the valve, if the valve position remains unchanged continuously within the set stall time, the actuator will judge that the motor is stalled and trigger a stall alarm.

3.3.6 P05- Ref Polarity

Switch forward/reverse polarity for 4–20mA signal from external DCS/PLC.

3.3.7 P06- Low Level Ref Signal Calibration

DCS/PLC sends 4mA standard low signal to actuator; the actuator samples this signal and takes it as the calibrated lower limit of the set signal.

3.3.8 P07- High Level Ref Signal Calibration

DCS/PLC transmits standard 20mA high-level signal to the actuator, which collects this signal as the calibrated upper limit of the given signal.

3.3.9 P08-Feedback Polarity

Switch forward/reverse polarity for 4–20mA position feedback signal sent to DCS/PLC.

3.3.10 P09- Low Level Feedback Signal Calibration

Enter parameter setting mode, actuator outputs ~4mA feedback signal to DCS/PLC. Adjust percentage value until the controller reads precise 4mA, save the value to complete feedback low-end calibration.。

3.3.11 P10- High Level Feedback Signal Calibration

Enter parameter setting, actuator outputs roughly 20mA feedback to DCS/PLC. Tune the percentage value till the controller reads accurate 20mA, save the parameter for feedback high-end calibration.

3.3.12 P11-Close Direction

"SS Clockwise": Valve opens clockwise and closes counterclockwise.

"NS Counterclockwise": Valve closes clockwise and opens counterclockwise.

Note 1: Reconfirm fully open and fully closed positions after modifying this parameter.

3.3.13 P12-Brake Time

Braking time: braking duration of actuator. Adjust this parameter to optimize braking effect if braking is unsatisfactory.

3.3.14 P13-Remote Enable Flag

When this parameter is set to OFF, remote control is forcibly disabled.

When set to ON, users may switch to remote control mode via the designated button.

3.3.15 P14-Encoder Direction

Factory parameter for encoder forward/reverse mounting setting, no user adjustment needed normally.

3.3.16 P15- Local Jog / Hold Mode

Set whether the actuator operates in jog control mode or hold control mode under local control mode.

3.3.17 P16-Encoder Type

Factory parameter for feedback selection (magnetic encoder / potentiometer). Preconfigured at factory, user modification is unnecessary in most cases.

3.3.18 P17- Automatic Control Type

Select remote control type: analog control or fieldbus communication control.

3.3.19 P18-Slave Address

Select remote control type: analog control or bus communication control.

3.3.20 P19-Baudrate

Set bus communication baud rate.

3.3.21 P20-Parity

Set bus communication parity mode.

3.3.22 P21-Comm Timeout Time

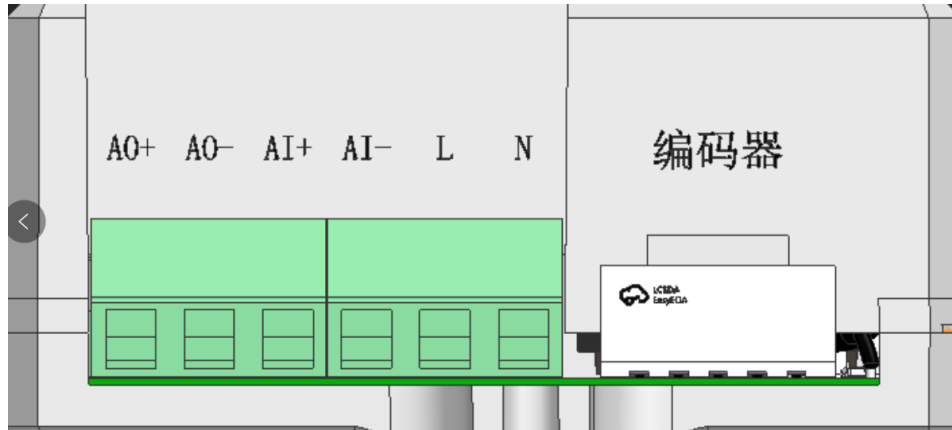
Set bus communication timeout time. E07 bus fault alarm will activate when no data is transmitted from master within the set time.

4. Alarm Information

Alarm Code	Alarm Information	Alarm Causes	Solution
E01	Encoder Communication Error	Encoder loose or faulty	Check whether the encoder wiring is loose or the encoder is

			damaged.
E02	Motor Stall Error	Encoder position remains unchanged for 5s while opening/closing valve.	Stop operation and inspect valve for jamming or blockage.
E03	Open Overlimit	Valve position exceeds open confirm position by 10%.	Reverse valve operation to reset alarm.
E04	Close Overlimit	Valve position exceeds close confirm position by 10%.	Reverse valve operation to reset alarm.
E05	EEP Error	EEPROM Operation Error	Reset parameters in parameter interface. Repeated faults mean EEPROM may be damaged, contact manufacturer for repair.
E06	Ref Lost	Under remote analog mode, the 4–20mA signal is less than 2mA.	Check external analog signal.
E07	Fieldbus Error	Fieldbus Comm Error	Check external communication signal and wiring.

5. Hardware wiring



Connect 220V AC power to terminals L and N.

Connect the 4–20mA setpoint input to AI+ and AI-.

Connect the 4–20mA position feedback output to AO+ and AO-.

The encoder interface is pre-connected to a magnetic encoder or potentiometer at the factory. Users normally do not need to modify this wiring.

6. Notice to Users

Failures caused by the following circumstances shall not be covered under the manufacturer's free warranty service:

1. Improper operation by the user without following the procedures specified in the Product Manual;
2. Unauthorized repair or modification of the product by the user without consultation with the manufacturer;
3. Abnormal aging or malfunction of product components resulting from poor operating environment provided by the user;
4. Operation of the product beyond its rated specification range;
5. Product damage caused by force majeure including earthquakes, fires, floods, lightning strikes, abnormal voltage and other natural disasters;

6. Hardware damage caused by accidental dropping or transportation damage after purchase.

7. Disclaimer

In no event shall the Manufacturer, its suppliers and distributors be liable for special, indirect or consequential losses arising from the use of the equipment, whether based on contract terms, warranty period, negligence, tort, strict liability or any other legal grounds. Such losses include but are not limited to loss of profits and revenue, loss of use of supplied equipment and associated equipment, capital expenditure, costs of substitute equipment, labor and service fees, downtime costs, delays, as well as losses incurred by the purchaser's customers or any third party.

Furthermore, the Company and its suppliers shall not be liable for claims alleging defects caused by unqualified raw materials, defective design or non-standard production unless the user can provide conclusive supporting evidence. The Company reserves the right of final interpretation.

Should you have any questions regarding the actuator, please contact the Company or its local offices. All technical data, information and specifications are the latest versions available upon publication. The Company reserves the right to revise them without prior notice and shall bear no liability for any losses incurred thereby, with the final right of interpretation reserved by the Company.