

HURKO



HURKO Intelligent electric actuator

MODBUS Series
Operation Manual

1、Operate Mode

1.1 Local Operation

There are two knobs on the electric hood of actuator, one is a mode knob (red knob), the other one is operating knob (black knob) .If local electromotion operation to be required, you must make the red knob go to “**LOCAL**” position, and control the actuator by the black knob.

1.1.1 Inching Operation (if inching mode is selected, see 2.4.2.2)

If the black knob is made go to “**CLOSE**” position and holding, here actuator run in closing. The actuator stop running at once, once the black knob is released;

If the black knob is made go to “**OPEN**” position and holding, here actuator run in opening. The actuator stop running at once, once the black knob is released.

1.1.2 Maintain Operation (if maintain mode is selected, see 2.4.2.2)

If the black knob is made go to “**CLOSE**” position and holding, here actuator run in closing. After the black knob is released, the actuator run still in closing, till the stopping condition is met (such as arrive at limit closed and so on);

If the black knob is made go to “**OPEN**” position and holding, here actuator run in opening. After the black knob is released, the actuator run still in opening, till the stopping condition is met (such as arrive at limit opened and so on).

1.2 Local Stop

If the red knob is made go to “**STOP**” position, the actuator will prohibit all the electro motion operation.

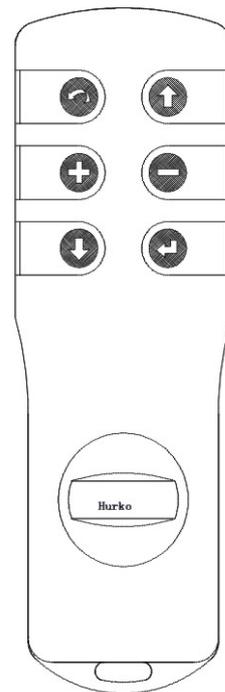
1.3 Remote Operation

1.3.1 Remote On-off Control (Manual Control)

1、The red knob is made go to “**REMOTE**” position; 2、The voltage is zero on port No.39 in terminal box of the actuator.3、The connections are executed right according to the item 4.2.

1.3.2 Remote Auto control

1、The red knob is made go to “**REMOTE**” position; 2、The voltage is not zero on port No.39 in terminal box of the actuator.3、The job is carried out of the item 2.4.3.1, and the connections are executed right referring to the item 4.4.



2、Parameter Set

2.1 Key Definition

2.2.1 The Key of the Setting Tool

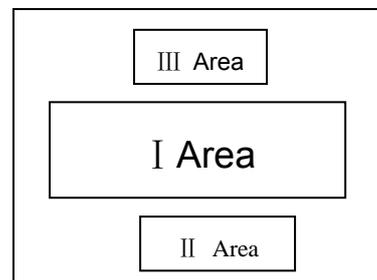
- NO.1 = ↑ (Up Key); NO.2 = ↓ (Down Key); NO.3 = ↻ (Return)/Stop Key ;
- NO.4 = ↵ (Accepting Key); NO.5 = + (Add)/Open Key ;
- NO.6 = - (Reduce)/Close Key ;

2.2.2 The Key of the Mode Knob (Red Knob)

- ↵: The red knob is made go to “**LOCAL**” position from “**STOP**” position;
- ↻: The red knob is made go to “**REMOTE**” position from “**STOP**” position;

2.2.3 The Key of the Operating Knob (Black Knob)

- ↓: The black knob is made go to “**CLOSE**” position;
- +: The black knob is made go to “**OPEN**” position;



2.2 Local Indication

The actuator has a liquid crystal display. The LCD screen is divided three areas, that is I area、II area、III area. The actuator has two indicated lamps, the green lamp means the full open position, and the red lamp means the full close position.

I area display the valve position. The valve position is displayed with the way of the percentage digital and the graphics, the valve position display precision is 1%.

II area display the control mode, namely “LOCAL INCHING”、 “LOCAL MAINTAIN”、 “STOP”、 “REMOTE AUTO”、 “REMOTE MANUL”;

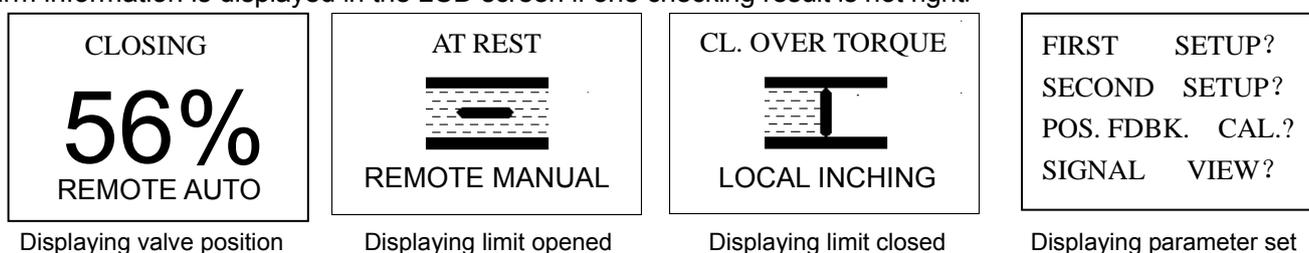
III area display the electro motion state, namely “CLOSING”、 “OPENING”、 “AT REST” or alarm information (see the item 5 Alarm Information) .

The LCD screen has not dividing areas when the LCD is in parameter setting.

2.3 Power On or System Reset

2.3.1 System Checking Self on Power up

After powering up and initialization, The instructions、ROM area、RAM area and A/D function of the control system are checked on. The valve position is displayed in the LCD screen if the checking result is right, or the alarm information is displayed in the LCD screen if one checking result is not right.



2.3.2 System Reset

The control system is reset through fair and foul if the red knob is made go to “STOP” position、 the black knob is made go to “CLOSE” position and is held in 5 seconds long.

2.4 Customizing the Actuator

Notice: When carrying out menu operation, if user has no key operation for 1 minute long, the LCD will return normal shows. Besides, after carrying out menu operation, you should use the “↶” key until you make the LCD display normal show.

The value showed firstly is the last time setting on the LCD. User can checks the setting by availing oneself of the trait.

The LCD will return the last menu if pressing “↶” key in the menu.

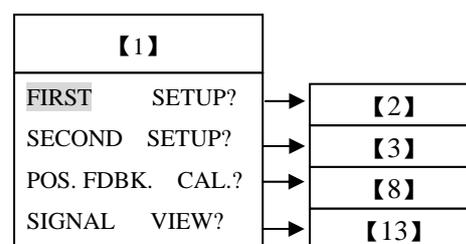
2.4.1 Entering the Menu

The LCD can display the parameter setup 【1】 menu if the red knob is made go to “LOCAL” position and press the No.1~No.4 key on the setting tool; or place the red knob to “STOP” position and the black knob is made go to “OPEN” position and is held in 3 seconds long.

2.4.2 FIRST SETUP

In 【1】 menu, using “↑” or “↓” key to select “FIRST SETUP” item, and press “↵” key, then the LCD display the 【2】 menu.

There are 8 items in 【2】 menu, namely “CLOSE DIRECTION”、 “LOCAL CONTROL MODE”、 “CLOS TORQUE VALUE”、 “OPEN TORQUE VALUE”、 “CLOSE SEATING”、 “VALVE CLOS LIMIT” 、 “VALVE OPEN LIMIT” and “LCD DISPLAY”. You can select the item using “↑” or “↓” key.

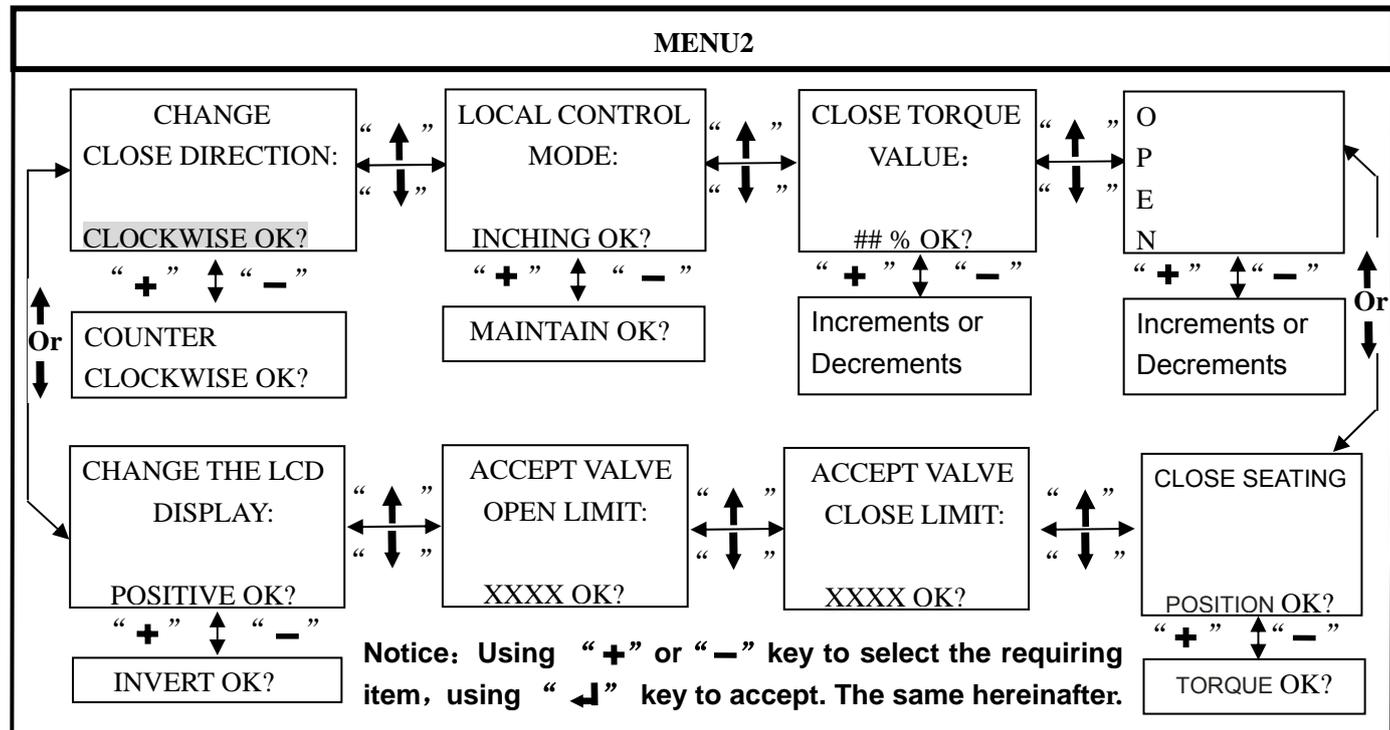


2.4.2.1 CLOSE DIRECTION

In the item, the LCD display firstly the last time setting “CLOCKWISE” or “COUNTER CLOCKWISE” . Using “+” or “-” key to select the requiring item, using “↵” key to accept. The LCD will return the last menu pressing “↶” key, the last time setting is not changed. User can checks the setting value last time by availing oneself of the trait.

2.4.2.2 LOCAL CONTROL MODE

In this item, the LCD display firstly the last time setting “INCHING” or “MAINTAIN”. Using “+” or “-” key to select the requiring item, using “↵” key to accept.



2.4.2.3 CLOS TORQUE VALUE

The output torque from the actuator to close the valve may be configured between 30% and 100% of the rated torque (as stated on the actuator nameplate), in 1% increments or decrements (unless limited by the factory) by using “+” or “-” key and by using “↵” key to accept.

Should the user select a maximum torque setting less than 100% due to valve or gearbox limitations. If the maximum allowable % setting does not equal 100% (e.g. 85%) then the maximum torque value has been limited. It is intended to limit the maximum output torque capability of the actuator in order to prevent possible damage for the valve and actuator resulting from excessive torque.

2.4.2.4 OPEN TORQUE VALUE

As same as the item 2.4.2.3.

2.4.2.5 CLOSE SEATING

1. Configure the actuator to close on “TORQUE” limit for seating valve types such as wedge gate and globe.
2. Select “POSITION” limit for valve types such as ball, butterfly, plug, sluice gate, parallel slide, knife gate, and through conduit.
3. Enter the the “MENU2”, switch the page to **CLOSE SEATING**, and then choose **TORQUE** or **POSITION** by pressing “+” or “-” key. Press the “↵” for saving and the “⏪” to the previous menu.

2.4.2.6 VALVE LIMIT CLOSED

It is discretional that the position limit is confirmed. You can confirm limit closed firstly, or limit opened firstly.

In this item, the LCD display the percent value (0%~100%) for full journey of the position meter in actuator. You can turn the hand wheel of the actuator to make the valve go to the position limit closed; or place the red knob to “LOCAL” position, to make the valve go to the position limit closed by electro motion. Pressing “↵” key to accept the position limit closed, and the red lamp twinkle two times.

2.4.2.7 VALVE LIMIT OPEN

In this item, the LCD display the percent value (0%~100%) for full journey of the position meter in actuator.

You can turn the hand wheel of the actuator to make the valve go to the position limit opened; or place the red knob to “LOCAL” position, to make the valve go to the position limit opened by electro motion. Pressing “ ” key to accept the position limit opened, and the green lamp twinkle two times.

Notice: The percent 0% and 100% denote separately the minimum and maximum of the position meter. The journey from the limit closed to the limit opened must not go beyond the points.

If needing to confirm another limit by electro motion after confirming one limit, you should not quit the item and enter the another limit menu and accept the limit after making the valve go to another limit by electro motion, otherwise “MOTOR OVERLOAD” alarm information appear.

2.4.2.8 LCD DISPLAY

In this item, the LCD display firstly the last time setting “INVERT” (invert display) or “POSITIVE” (positive display) . Using “ + ” or “ - ” key to select the requiring item, using “ ↵ ” key to accept.

2.4.3 SECONDE SETUP

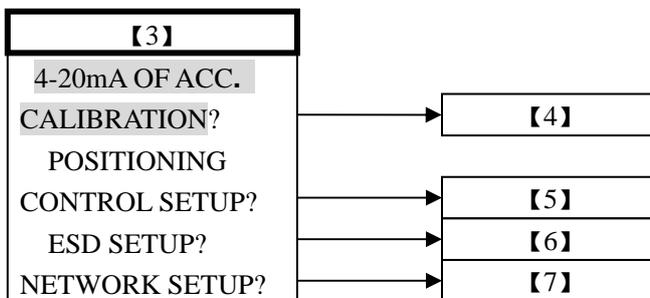
In 【1】 menu, using “ ↑ ” or “ ↓ ” key to select “SECOND SETUP?” item, and press “ ↵ ” key, then the LCD display the 【3】 menu.

There are 4 items in 【3】 menu, namely “4-20mA OF ACC. CALIBRATION”, “POSITIONING CONTROL SETUP”, “ESD SETUP”, “NETWORK SETUP” .

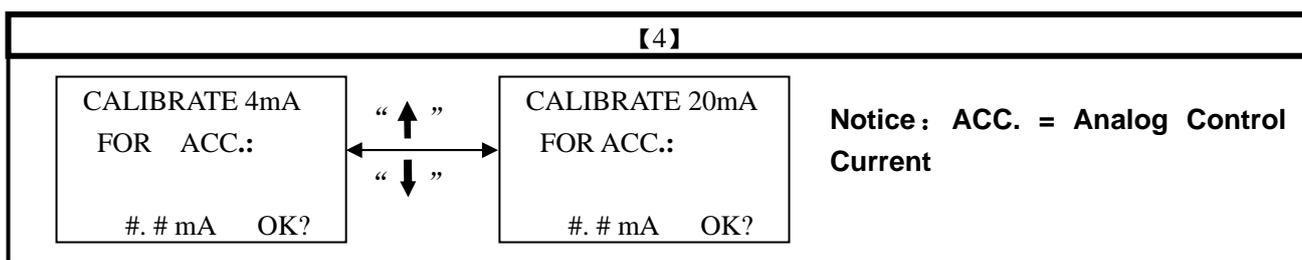
2.4.3.1 CALIBRATE FOR ACC.

In 【3】 menu, using “ ↑ ” or “ ↓ ” key to select “CALIBRATE FOR ACC.” item, and press “ ↵ ” key, then the LCD display the 【4】 menu.

In order to increase the control precision, user should re-calibrate the 4-20mA OF ACC. (analog control current) signals input from the default which it may be different from user's standard scale.



In 【4】 menu, the LCD display the value(mA) of the ACC. to be collect by the actuator. using “ ↑ ” or “ ↓ ” key to select “CALIBRATE 4mA FOR ACC.” or “CALIBRATE 20mA FOR ACC.”, and user' control system or a calibrator exports the ACC. to the acuter, pressing “ ↵ ” key to accept the ACC. After the ACC. levels off.



2.4.3.2 POSITIONING CONTROL

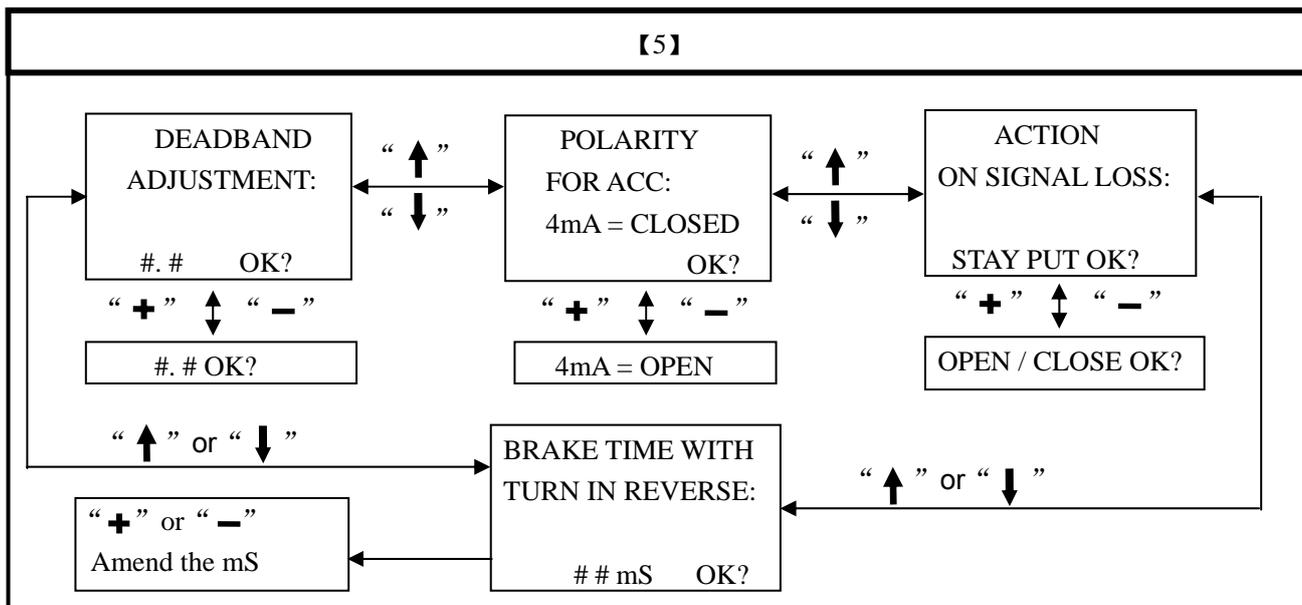
In 【3】 menu, using “ ↑ ” or “ ↓ ” key to select “POSITIONING CONTROL SETUP” item and press “ ↵ ” key, then the LCD display the 【5】 menu.. There are 4 items in the 【5】 menu, namely “DEADBAND ADJUSTMENT”, “POLARITY FOR ACC.”, “ACTION ON LOSS SIGNAL”, “BRAKE TIME WITH TURN IN REVERSE” .

2.4.3.2.1 DEADBAND ADJUSTMENT

The deadband means that the least percent of the valve's journey is required when the actuator runs again. If the actuator hunts or responds unnecessarily to a fluctuating set point signal, the deadband should be increased. If more accurate control is required, the deadband should be decreased.

This function is effectual in remote auto control mode. In 【5】 menu, using “ ↑ ” or “ ↓ ” key to select “DEADBAND ADJUSTMENT” item, the LCD display firstly the last time setting (percentage of the valve's journey). The value can be changed in“0.1%~9.9%”bound or “SELF ADAPTING”(the deadband is worked

out in running) by “+” or “-” key, using “↵” key to accept.



2.4.3.2.2 POLARITY FOR ACC.

This function is used to confirm the valve’s position which actuator will run to when the 4mA appear in remote autocontrol mode.

In 【5】 menu, using “↑” or “↓” key to select “POLARITY FOR ACC.” item, the LCD display firstly the last time setting “4mA = CLOSED” or “4mA = OPEN”. Using “+” or “-” key to select the requiring item, using “↵” key to accept.

Notice: 20mA = OPEN accordingly once 4mA = CLOSED, whereas 20mA = CLOSED accordingly once 4mA = OPEN.

2.4.3.2.3 ACTION ON SIGNAL LOSS

If actuator works in the remote 4~20mA autocontrol Mode, **Lost Signal** occur when the analog control signal is lower than half the 4mA.

If **Lost Signal** occurred, the Action on Lost Signal of actuator should be configured to one of the follows: “STAY PUT” (no action)、or “CLOSED”、or “OPEN” .

In 【5】 menu, using “↑” or “↓” key to select “ACTION ON LOST SIGNAL” item, the LCD display firstly the last time setting “STAY PUT” or “CLOSED” or “OPEN” . Using “+” or “-” key to select the requiring item, using “↵” key to accept.

2.4.3.2.4 BRAKE TIME WITH TURN IN REVERSE

Brake Time with Turn in Reverse is used to give a reverse energy to the motor and make the motor stop quickly so that we can obtain an accurate valve position control.

In 【5】 menu, using “↑” or “↓” key to select “BRAKE TIME WITH TURN IN REVERSE” item, the LCD display firstly the last time setting, it is reverse turn time (mS) that actuator carry out momentarily. The value can be changed in “0~50mS” bound by “+” or “-” key, using “↵” key to accept.

Notice: The actuator is not the brake function if the setting 0mS is selected.

2.4.3.3 ESD SETUP

In 【3】 menu, using “↑” or “↓” key to select “ESD SETUP” item, and press “↵” key, then the LCD display the 【6】 menu.

Notice: to select “ESD SETUP” item, pressing “+” or “-” will make the system reset, this is well-balanced (factory may use in test) .

2.4.3.3.1 ESD ACTION

This function is used to stipulate the actuator’s action on the Emergency circumstances (when the actuator senses ESD effectual signal at the ESD control terminal) . There are 3 ESD actions: “OPEN”、or “CLOSED” or “DISABLE” .

In **【6】** menu, using “↑” or “↓” key to select “**ESD ACTION**” item, the LCD display firstly the last time setting “**OPEN**”、or “**CLOSED**” or “**DISABLE**” . Using “+” or “-” key to select the requiring item, using “↵” key to accept.

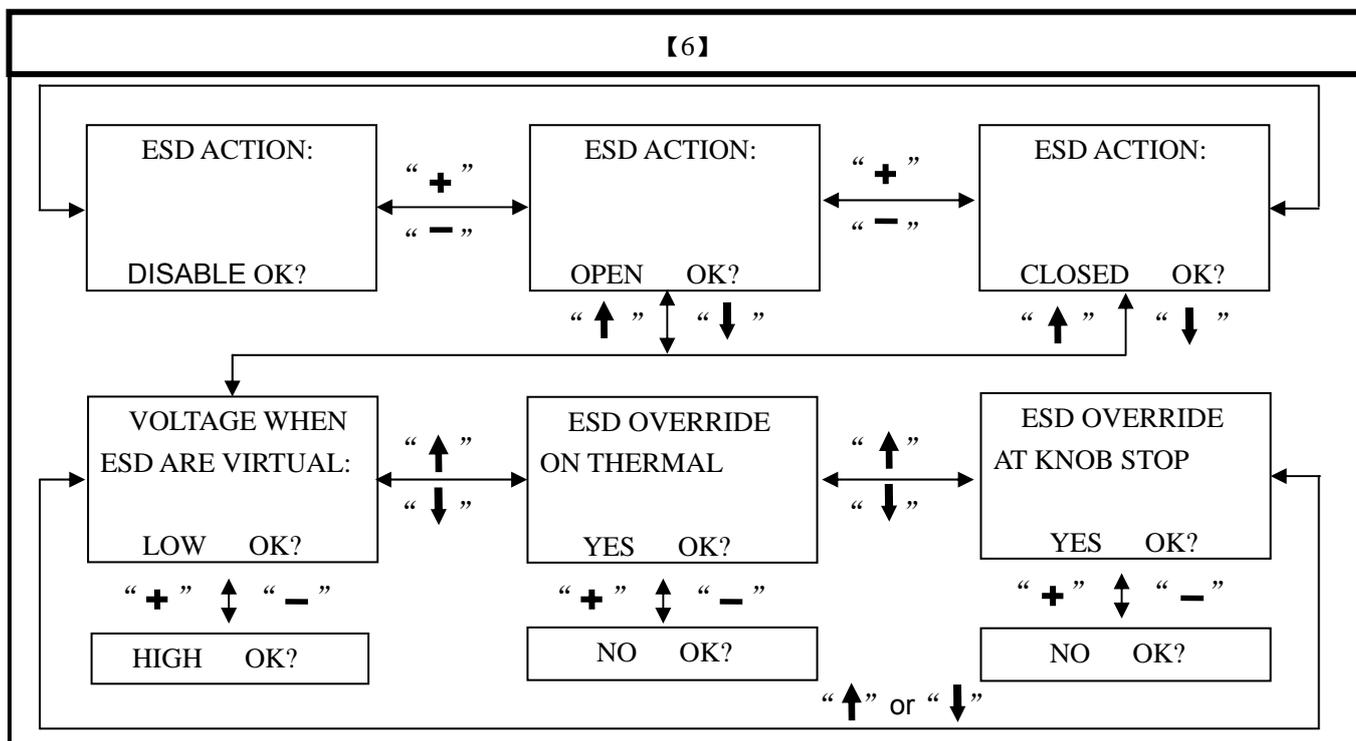
2.4.3.3.2 VOLTAGE WHEN ESD ARE VIRTUAL (ESD effectual voltage values)

There are maybe two effectual voltage values at the ESD control terminal: Zero voltage signal means low level (**LOW**), nonzero voltage signal means high level (**HIGH**) .

In **【6】** menu, using “↑” or “↓” key to select “**VOLTAGE WHENESD ARE VIRTUAL**” item, the LCD display firstly the last time setting “**LOW**” or “**HIGH**” . Using “+” or “-” key to select the requiring item, using “↵” key to accept.

2.4.3.3.3 ESD OVERRIDE ON THERMAL

It may be desirable that the **ESD** action override motor thermal event. This event bypassed can be selectable.



In **【6】** menu, using “↑” or “↓” key to select “**ESD OVERRIDE ON THERMAL**” item, the LCD display firstly the last time setting “**YES**” or “**NO**” . Using “+” or “-” key to select the requiring item, using “↵” key to accept.

2.4.3.3.4 ESD OVERRIDE AT KNOB STOP

It may be desirable that the **ESD** action override event which the red knob is made go to “**STOP**” position. This event bypassed can be selectable.

In **【6】** menu, using “↑” or “↓” key to select “**ESD OVERRIDE AT KNOB STOP**” item, the LCD display firstly the last time setting “**YES**” or “**NO**” . Using “+” or “-” key to select the requiring item, using “↵” key to accept.

2.4.3.5 NETWORK SETUP

This item should be setup beforehand when the actuator is controlled via the field bus mode (**Modbus**) .

In **【3】** menu, using “↑” or “↓” key to select “**NETWORK SETUP**” item, and press “↵” key, then the LCD display the **【7】** menu.

2.4.3. 5.1 SLAVE ADDRESS1 or ADDRESS2

SLAVE ADDRESS means the actuator’s code which can be identified by the master in network control system. **SLAVE ADDRESS1** is set simply generally, and **SLAVE ADDRESS2** is set still if the network is of redundancy.

In **【7】** menu, using “↑” or “↓” key to select “**SLAVE ADDRESS1**” or “**SLAVE ADDRESS2**” item, the LCD display firstly the last time address setting. The value can be changed in “1~247” bound by “+” or “-” key, using “↵” key to accept.

2.4.3. 5.2 BAUDRATE:

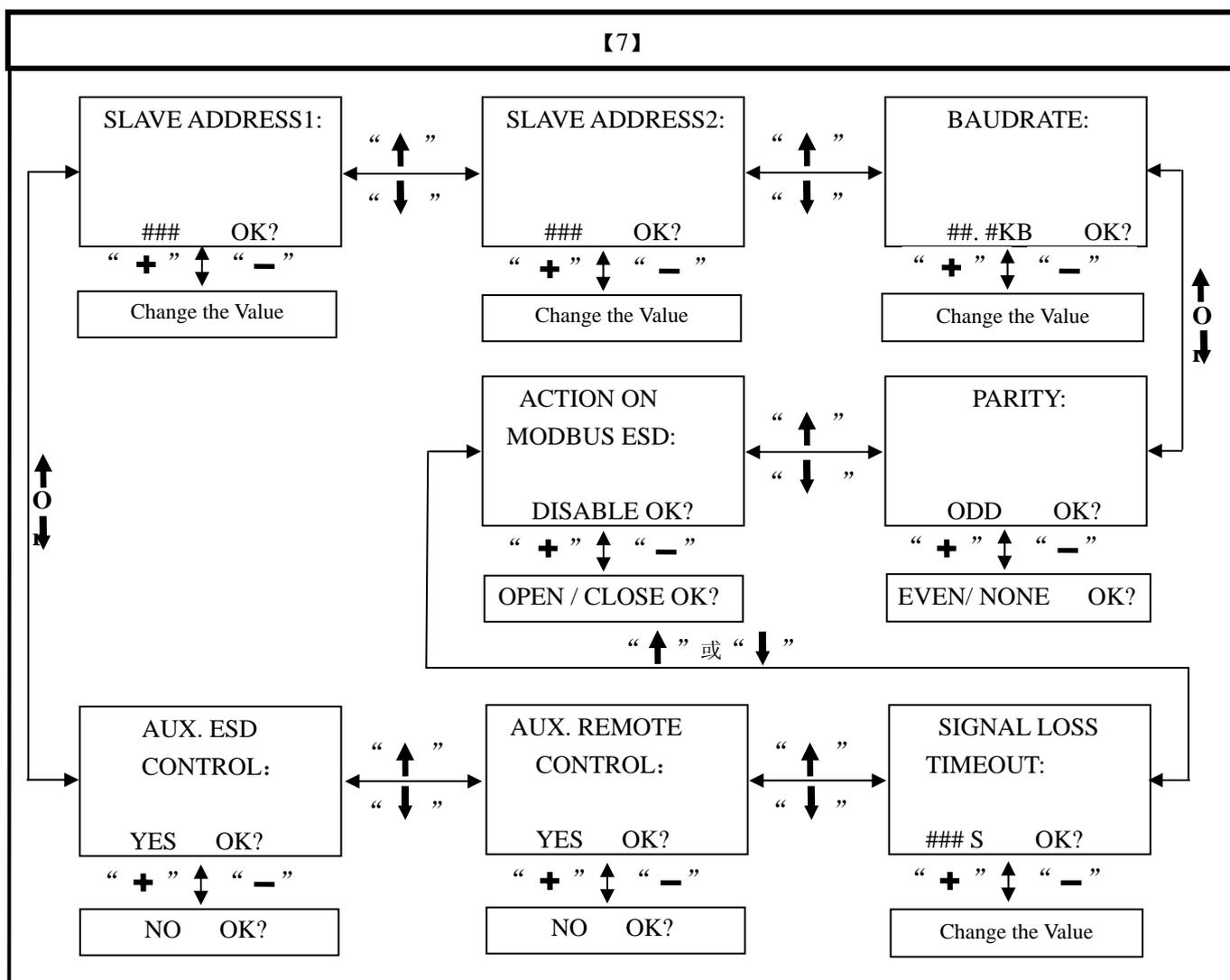
BAUDRATE means the data bits are transmitted at the loop in network control system, the units is **KB/S**. The baudrate setting include 8 choices, that are 300bps, 600 bps,1200 bps,2400 bps,4800 bps,9600 bps,19200 bps,38400 bps.

In **【7】** menu, using “↑” or “↓” key to select “**BAUDRATE**” item, the LCD display firstly the last time baudrate setting. The value can be changed in “0.3~38.4” bound by “+” or “-” key, using “↵” key to accept.

2.4.3. 5.3 PARITY:

This item sets the parity bit that the data bits are transmitted at the loop in network control system.

In **【7】** menu, using “↑” or “↓” key to select “**PARITY**” item, the LCD display firstly the last time parity setting “**ODD**” or “**EVEN**” or “**NONE**”. Using “+” or “-” key to select the requiring item, using “↵” key to accept.



2.4.3. 5.4 ACTION ON MODBUS ESD

This function is used to stipulate the actuator’s action on the Emergency circumstances (when the actuator receives the bus ESD signal). There are 3 ESD actions: “**OPEN**”、or “**CLOSED**” or “**DISABLE**” .

In **【7】** menu, using “↑” or “↓” key to select “**ACTION ON MODBUS ESD**” item, the LCD display firstly the last time setting “**DISABLE**” or “**OPEN**” or “**CLOSED**” . Using “+” or “-” key to select the requiring item, using “↵” key to accept.

2.4.3. 5.5 SIGNAL LOSS TIMEOUT

This item stipulates the time for the bus signal loss. The bus signal loss is affirmed if the actuator takes not in the bus signal in the time, and the actuator will carry out the action setting in the **【5】** menu.

In **【7】** menu, using “↑” or “↓” key to select “**SIGNAL LOSS TIMEOUT**” item, the LCD display firstly the last time setting. The value can be changed in “1~255 S” bound by “+” or “-” key, using “↵” key to accept.

2.4.3. 5.6 AUX ESD AND REMOTE CONTROL

The 4 auxiliary input ports are provided to user in the actuator. And the ON/OFF status of the other device can be sent to the Host. The 4 auxiliary input ports can be treated as the remote control signal input ports, the AUX ESD is one port and the AUX REMOTE CONTROL are 3 ports.

The ports are regarded as the signal input ports from the other device if “no” is selected. The digital 1 is sent to the Host when the 24Vdc or 220Vac input to the ports, and the digital 0 is sent to the Host when the 0V input to the ports.

The ports are regarded as the AUX ESD or the AUX REMOTE CONTROL input ports if “YES” is selected. The actuator will carry out correlative action when the 24Vdc or 220Vac input to the ports, and the digital 1 is sent to the Host. The digital 0 is sent to the Host when the 0V input to the ports.

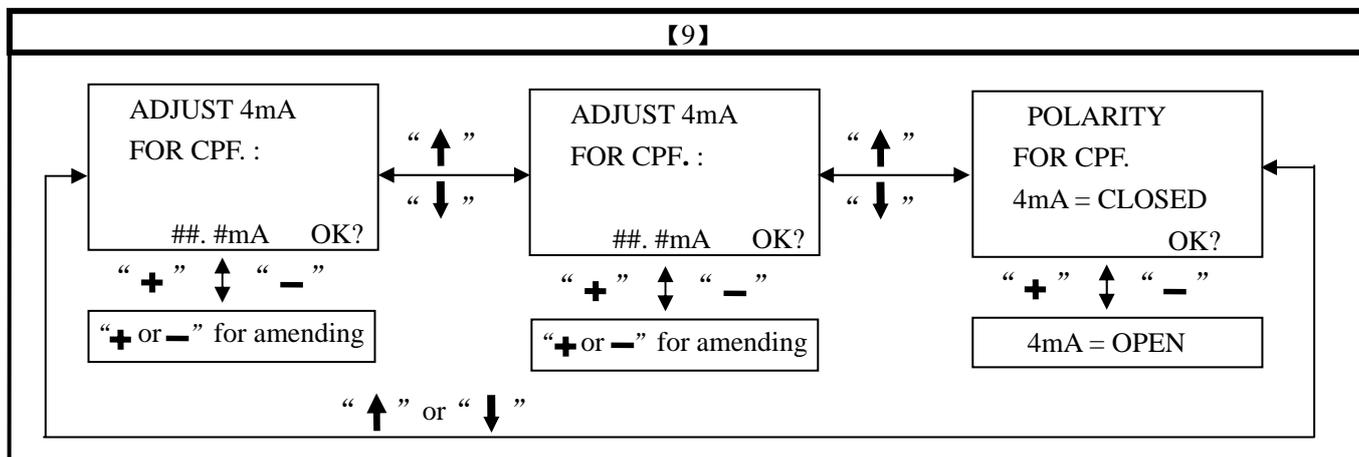
The AUX ESD or the AUX REMOTE CONTROL action has precedence over bus control action.

In **【7】** menu, using “↑” or “↓” key to select “**SIGNAL LOSS TIMEOUT**” item, the LCD display firstly the last time setting. The value can be changed in “1~255 S” bound by “+” or “-” key, using “↵” key to accept.

2.4.4 POS. FDBK.

In **【1】** menu, using “↑” or “↓” key to select “**POS. FDBK.**” item, and press “↵” key, then the LCD display the **【9】** menu.

The actuator transmits the 4mA~20mA current signal for the valve’s position to the centre control room when it works. If the feedback signal is not precision enough, you can carry out calibration via this item.



2.4.4.1 ADJUST 4mA FOR CPF.

To calibrate the 4mA analog position signal transmitted to the centre control room or a calibrator.

In **【9】** menu, using “↑” or “↓” key to select “**ADJUST 4mA FOR CPF.**” item, and the actuator forces to transmit the 4mA current signal for user’s checking. The value of the 4mA can be changed by “+” or “-” key, using “↵” key to accept.

2.4.4.2 ADJUST 20mA FOR CPF.

To calibrate the 20mA analog position signal transmitted to the centre control room or a calibrator.

In **【9】** menu, using “↑” or “↓” key to select “**ADJUST 20mA FOR CPF.**” item, and the actuator forces to transmit the 20mA current signal for user’s checking. The value of the 20mA can be changed by “+” or “-” key, using “↵” key to accept.

2.4.4.3 POLARITY FOR CPF.

These functions confirm the valve's position which the value of the 4mA signal denotes.

In **【9】** menu, using “↑” or “↓” key to select “**POLARITY FOR CPF.**” item, the LCD display firstly the last time setting “**4mA = CLOSED**” or “**4mA = OPEN**”. Using “+” or “-” key to select the requiring item, using “↵” key to accept.

Notice: 20mA = OPEN accordingly once 4mA = CLOSED, whereas 20mA = CLOSED accordingly once 4mA = OPEN.

2.4.5 SIGNAL VIEW

In **【1】** menu, using “↑” or “↓” key to select “**SIGNAL VIEW**” item, and press “↵” key, then the LCD display the **【13】** menu.

2.4.5.1 POSITION OF THE SELECTOR KNOB

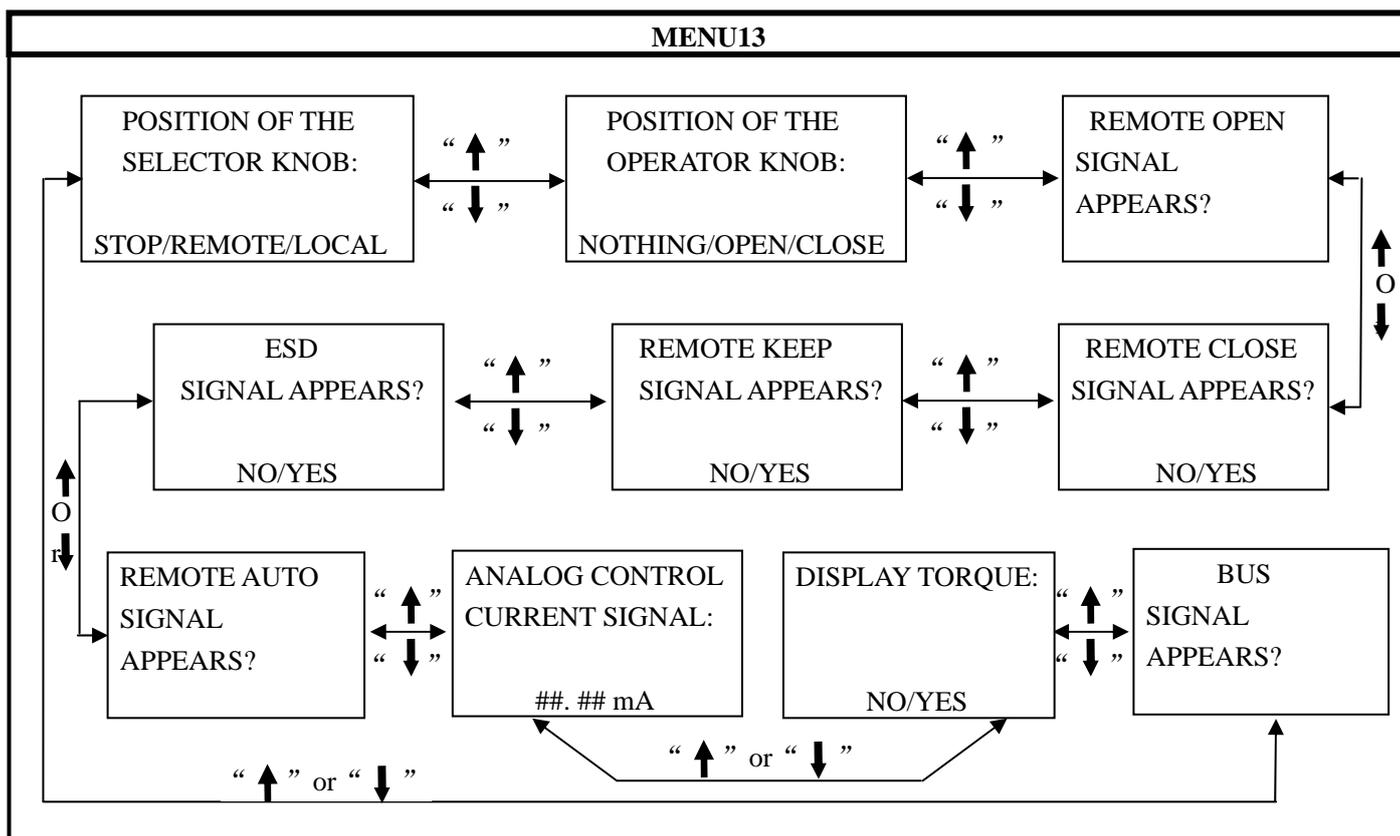
In **【13】** menu, using “↑” or “↓” key to select “**POSITION OF THE SELECTOR KNOB**” item, then the LCD display the position which the red knob locate at.

When the red knob is placed at the “**STOP**” position, the LCD display “**STOP**”, otherwise making a mistake;

When the red knob is placed at the “**LOCAL**” position, the LCD display “**LOCAL**”, otherwise making a mistake;

When the red knob is placed at the “**REMOTE**” position, the LCD display “**REMOTE**”, otherwise making a mistake;

Notice: The return operation is of no effect by the **Mode Knob** in the item.



2.4.5.2 POSITION OF THE OPERATOR KNOB

In **【13】** menu, using “↑” or “↓” key to select “**POSITION OF THE OPERATOR KNOB**” item, then the LCD display the position which the black knob locate at.

When the red knob is placed at the “**OPEN**” position, the LCD display “**OPEN**”, otherwise making a mistake;

When the red knob is placed at the “**CLOSE**” position, the LCD display “**CLOSE**”, otherwise making a mistake;

When the red knob is placed at the “**NOTHING**” position, the LCD display “**NOTHING**”, otherwise making a mistake;

Notice: In the item, when you carry out the down operation or checks the “CLOSE” position, The LCD displays firstly the “CLOSE”, then the next item.

2.4.5.3 REMOTE OPEN SIGNAL

In 【13】 menu, using “↑” or “↓” key to select “REMOTE OPEN SIGNAL APPEAR” item, The LCD will display “YES” (if the signal is existent) or “NO” (if the signal is nonexistent) .

2.4.5.4 REMOTE CLOSE SIGNAL

In 【13】 menu, using “↑” or “↓” key to select “REMOTE CLOSE SIGNAL APPEAR” item, The LCD will display “YES” (if the signal is existent) or “NO” (if the signal is nonexistent) .

2.4.5.5 REMOTE KEEP SIGNAL

In 【13】 menu, using “↑” or “↓” key to select “REMOTE KEEP SIGNAL” item, The LCD will display “YES” (if the signal is existent) or “NO” (if the signal is nonexistent) .

2.4.5.6 ESD SIGNAL

In 【13】 menu, using “↑” or “↓” key to select “ESD SIGNAL APPEAR” item, The LCD will display “YES” (if the signal is existent) or “NO” (if the signal is nonexistent) .

2.4.5.7 REMOTE AUTO SIGNAL

In 【13】 menu, using “↑” or “↓” key to select “REMOTE AUTO SIGNAL APPEAR” item, The LCD will display “YES” (if the signal is existent) or “NO” (if the signal is nonexistent) .

2.4.5.8 ANALOG CONTROL CURRENT SIGNAL

In 【13】 menu, using “↑” or “↓” key to select “ANALOG CONTROL CURRENT SIGNAL” item, The LCD will display the value(mA) of the ACC. To be collect by the actuator.

2.4.5.9 DISPLAY TORQUE

In 【13】 menu, using “↑” or “↓” key to select “DISPLAY TORQUE” item, The LCD will display the last time setting “YES” or “NO” . Using “+” or “-” key to select the requiring item, using “↵” key to accept.

2.4.5.10 BUS SIGNAL

In 【13】 menu, using “↑” or “↓” key to select “BUS SIGNAL” item, The LCD will display “YES” (if the signal is existent) or “NO” (if the signal is nonexistent) .

2.5 THE DEFAULT SETTING

CLOSE DIRECTION: CLOCKWISE	BRAKE TIME WITH TURN IN REVERSE: 0mS
LOCAL CONTROLMODE: INCHING	SLAVE ADDRESS1: 246
DEADBAND ADJUSTMENT: SELF ADATING	SLAVE ADDRESS2: 247
POLARITY FOR ACC: 4mA = CLOSED	BAUDRATE: 38.4KB
ACTION ON LOSS SIGNAL: STAY PUT	PARITY: NONE
ESD SETUP: DISABLE	ACTION ON MODBUS ESD: DISABLE E
LCD DISPLAY: POSITIVE	SIGNAL LOSS TIMEOUT: 255 S

3、 THE ALARM INFORMATION

3.1 CPU ERROR: When the “CPU ERROR” is displayed in the alarm area, it means a mistake occurs in the CPU of the actuator. The trouble can be raveled out by reset or through powering up over again after powering down. If this method is of no effect, you must replace the main control board with new it;

3.2 CL. OVERTORQUE: When the “CL. OVERTORQUE” is displayed in the alarm area, it means the torque the actuator supporting is bigger than the setting in the closing valve, the running of motor is halted and the restriction to forbid running in closing way is established. The restriction shall be eliminated if the actuator run a bit of distance in opening way or close torque setting is re-set.

3.3 OP. OVERTORQUE: When the “OP. OVERTORQUE” is displayed in the alarm area, it means the torque the actuator supporting is bigger than the setting in the opening valve, the running of motor is halted and the restriction to forbid running in opening way is established. The restriction shall be eliminated if the

actuator run a bit of distance in closing way or open torque setting is re-set.

3.4 LOST PHASE: When the “**LOST PHASE**” is displayed in the alarm area, it means the one phase of the 3 phase power supply is lost, then the running of motor is halted.

3.5 LOST ANALOG: When the “**LOST ANALOG**” is displayed in the alarm area, it means the **4mA~20mA** analog control current signal has lost, the actuator will act according to the setting of the **2.4.3.2.3** item.

3.6 OP. &CL. SIG. ON: When the “**OP. &CL. SIG. ON**” is displayed in the alarm area, it means the remote close signal and remote open signal are presence at one time, then the running of motor is halted.

3.7 TURN DIR. ERROR: When the “**TURN DIR. ERROR**” is displayed in the alarm area, it means the valve’s turn way is incorrectness, then the running of motor is halted.

3.8 POS. ERROR: When the “**POS. ERROR**” is displayed in the alarm area, it means the valve’s change is incorrectness (the clutch of the actuator may not put the electric position, or the mistake occurs for the absolute encoder), then the running of motor is halted.

3.9 ESD CLOSING: When the “**ESD CLOSING**” is displayed in the alarm area, it means the effectual voltage signal is presence at the ESD control terminal and actuator is carrying out close valve act.

3.10 ESD OPENING: When the “**ESD OPENING**” is displayed in the alarm area, it means the effectual voltage signal is presence at the ESD control terminal and actuator is carrying out open valve act.

3.11 ACTIVE ESD: When the “**ACTIVE ESD**” is displayed in the alarm area, it means the effectual voltage signal is presence still at the ESD control terminal, then all the electro motion operation to the actuator is of no effect whether the red knob is made go to “**LOCAL**” position or “**REMOTE**” position.

3.12 MOT.OVERTHERMAL: When the “**MOT.OVERTHERMAL**” is displayed in the alarm area, it means the motor’s temperature is hyperthermal, then the running of motor is halted (except **ESD** act) .

3.13 MOTOR OVERLOAD: When the “**MOTOR OVERLOAD**” is displayed in the alarm area, it means the motor is block up, then the running of motor is halted. This information indicates that the valve may be locked or the actuator’s rating torque is fall short of.

3.14 CAL. ERROR: When the “**CAL. ERROR**” is displayed in the alarm area, it means that the operation is false in **2.4.3.1 CALIBRATE FOR ACC.** item, you must calibrate it if the autocontrol mode is required.

3.15 BUS LOSS: When the “**BUS LOSS**” is displayed in the alarm area, it means that the **MODBUS** signal has lost, the actuator will act according to the setting of the **2.4.3.2.3** item.

4、Wiring diagram for the control

4.1 wiring box

The external connection wiring of the actuator is fetched out from the wiring box. The meanings of the terminals in the wiring box follows as:

Terminal numbers	Terminal symbol	Meanings of the Terminal	Terminal numbers	Terminal symbol	Meanings of the Terminal
		Earth Terminal of the Actuator	28		
1	U**	Power supply input 1	29	M_EARTH	Earth Terminal of the Modbus boards
2	V**	Power supply input 2			
3	W**	Power supply input 3	30	M_II_COM	Terminal COM. of the Modbus board II
4	0V	None steady DC 24V(-) output			
5	24Vdc	None steady DC 24V(+) output	31		
6			32		
7					
8			33	R- CLOSE	Remote close signal input terminal
9			34	R-HOLD	Remote holding signal input terminal
10			35	R- OPEN	Remote open signal input terminal
11			36	R-L-COM	Remote low voltage signal COM

12					
13					
14	M_II_A	Terminal A of the Modbus board II	37		
			38		
15	M_II_B	Terminal B of the Modbus board II	39	R-AUTO	Remote AUTO signal input terminal
16	M_I_A	Terminal A of the Modbus board I	40	R-H-COM	Remote high voltage signal COM
17	M_I_B	Terminal B of the Modbus board I	41		
18	M_I_COM	Terminal COM. of the Modbus board I	42		
19			43		
20			44		
			45		
21	M_I_A_R	A End Resistance of the Modbus board I	46	M_II_A_R	A End Resistance of the Modbus board II
22	CPT (+) *	Current position transmission (+)			
23	CPT (-)*	Current position transmission (-)			
24	M_I_B_R	B End Resistance of the Modbus board I	47	M_II_B_R	B End Resistance of the Modbus board II
25	ESD	ESD control input terminal			
26	ACC (+) *	Analog control current input (+)			
27	ACC (-) *	Analog control current input (-)			

****:** Terminal I 、 II wiring up 110Vac or 220Vac for one phase motor, Terminal III idles.

Notice: The contact's capability are all 5A/250Vac or 5A/30Vdc in the table.

The terminals with “*” is advisement, they are efficacious but user has called for it in the indent.

4.2 Remote On-off Control (Manual Control)

If user makes use of the none steady DC 24V output of the actuator, the centre control room connect wiring with the actuator are fig. 4-1、fig.4-2 and fig.4-3. The numbers in the circlet are the terminal name of the wiring box in the actuator.

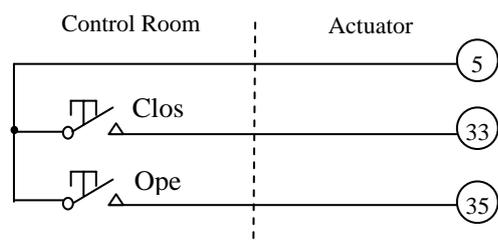


Fig.4-1 Inching control to open or close
For DC24V from actuator

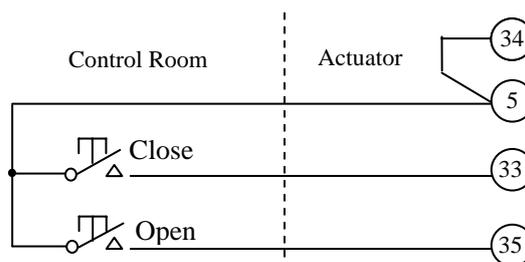


Fig.4-2 Maintaining control to open or close
For DC24V from actuator

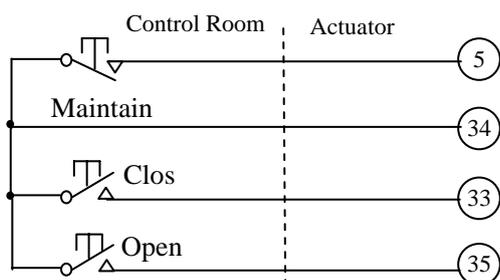


Fig.4-3 Maintaining or stop control to open or close for DC24V from actuator

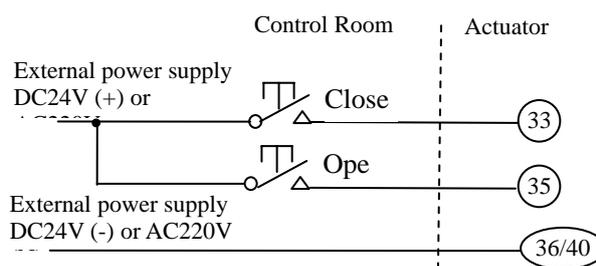


Fig.4-4 Inching control to open or close
for external power supply

If user makes use of external DC 24V or AC220V for controlling the actuator, the centre control room connect wiring with the actuator are fig. 4-4、fig.4-5、and fig. 4-6.

Notice: The terminal (-) of the DC 24V links the terminal 36 in the wiring box when the external DC 24V is used; The terminal **N** of the AC 220V links the terminal 40 in the wiring box when the external AC 220V is used. **Analogy hereinafter.**

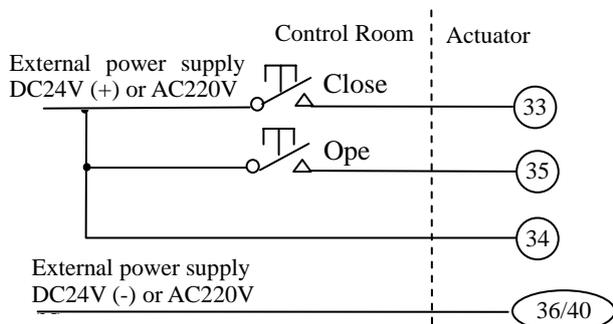


Fig.4-5 Maintaining or stop control to open or close for external power supply

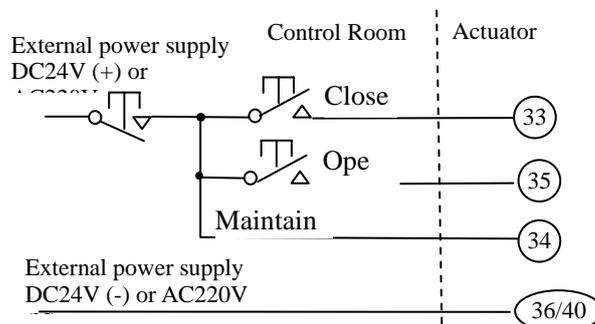


Fig.4-6 Maintaining or stop control to open or close for external power supply

If the **Code Switch 1** on the main control board in the actuator is dialed to the “ON” position, it can be realized that the two lines fulfill the function of the “**open on the signal being, close on none signal**”; If the **Code Switch 2** on the main control board in the actuator is dialed to the “ON” position, it can be realized that the two lines fulfill the function of the “**close on the signal being, open on none signal**”. The centre control room connect wiring with the actuator are fig. 4-7、fig.4-8(the control power supply from the actuator) 、fig. 4-9、and fig.4-10(the control power supply from the exterior).

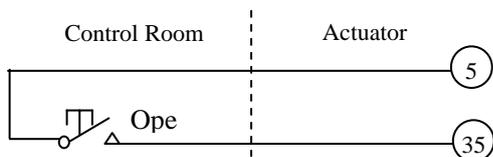


Fig.4-7 Two lines control to open for DC24V from the actuator

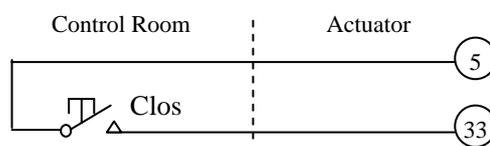


Fig.4-8 Two lines control to close for DC24V from the actuator

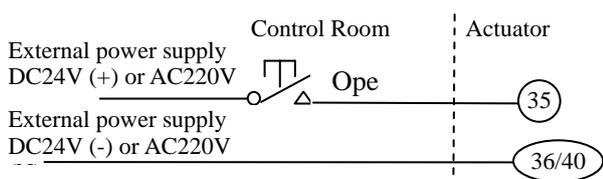


Fig.4-9 Two lines control to open for external power supply

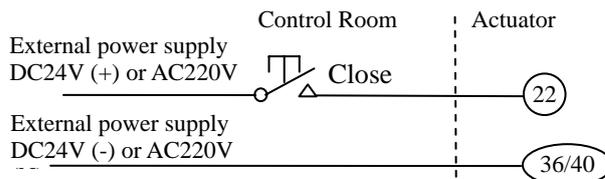


Fig.4-10 Two lines control to close for external power supply

4.3 ESD Control

The terminal 12 in the wiring box is the **ESD** control terminal. The centre control room connect wiring with the actuator are fig. 4-11、fig.4-12(the control power supply from the actuator) 、fig. 4-13、and fig.4-14(the control power supply from the exterior) for the **ESD** control.

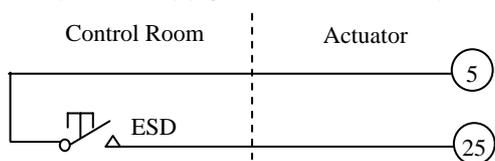


Fig.4-11 ESD control of nonzero voltage for DC24V from the actuator

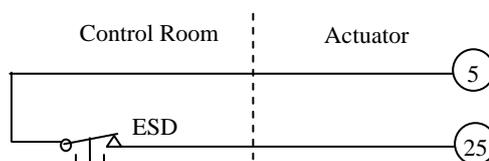


Fig.4-12 ESD control of zero voltage for DC24V from the actuator

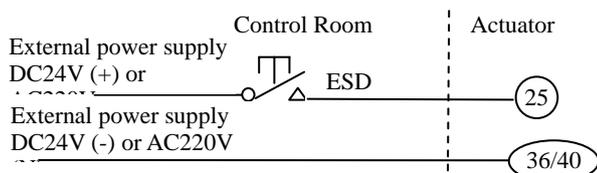


Fig.4-13 ESD control of nonzero voltage for external power supply

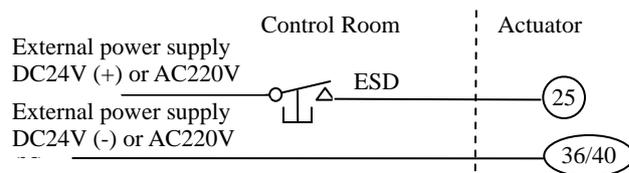


Fig.4-14 ESD control of zero voltage for External power supply

4. 4 Remote Analog Current Control (Autocontrol)

The actuator can receive **4mA~20mA** analog current signal for positioning control if the signal wired up to terminal 26 and terminal 27. But this is advisement, user must make sure whether or not request the function when order. The centre control room connect wiring with the actuator are fig. 4-15and fig.4-16 for the remote manual control switching to the remote autocontrol.

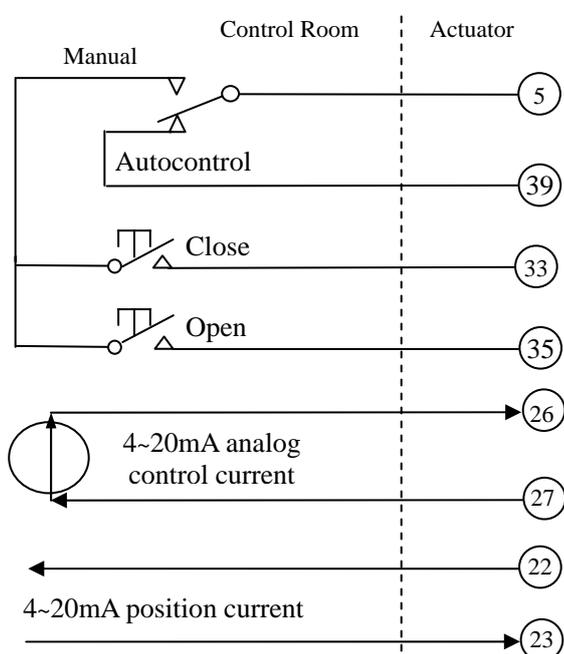


Fig.4-15 Remote autocontrol or manual control to switch each other for DC24V from the actuator

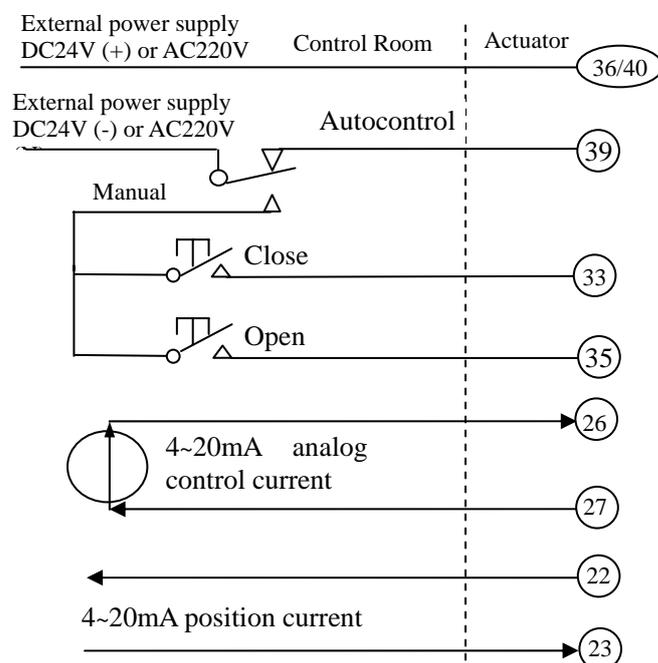


Fig.4-16 Remote autocontrol or manual control to switch each other for external power supply

4. 5 Position Current transmission

The actuator can provide **4~20mA** position current signal output from terminal 22 and terminal 23 in the box. The maximum load is 700Ω. But this is advisement, user must make sure whether or not request the function when order.

4. 6 Modbus Control

Modbus Control can be a channel communication and two channel communications (redundancy mode, using this mode you must declare it in indent). The master communicates with Modbus board I of the actuator in a channel mode. The master communicates with Modbus board I and also with Modbus board II of the actuator in the redundancy mode. So, the redundancy mode can be used in the environment for exigent security. The master can communicates with the other Modbus board if a Modbus board takes place trouble.

The detail of the modbus protocol please refer to the «**HKM II** Modbus technique manual».