# COMPACT ELECTRIC ACTUATOR

## Operating instruction

# SWITCH-TYPE ELECTRIC ACTUATOR

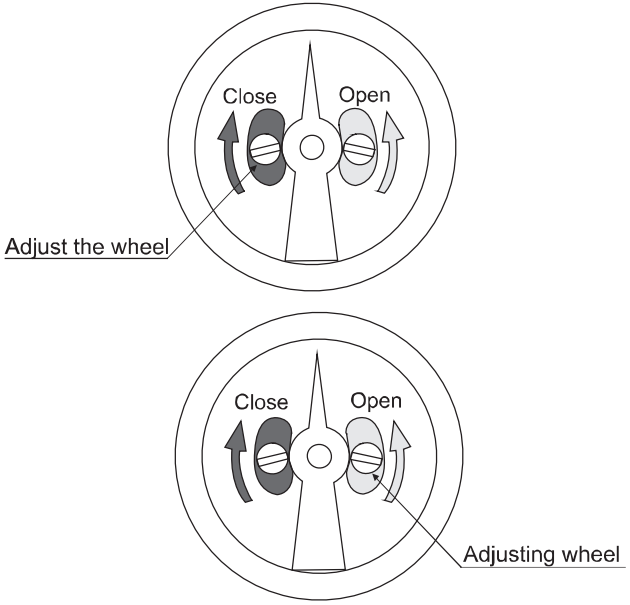
Fine small electric actuator with unique design, external show and internal rigidity, operating life more than 10 times the national standard, with excellent performance, indisputable advantages make you look at it with new eyes!
Free bracket, coupling model for our company's latest patented products, so that the electric device is smaller, lighter, more stable, more precise, more economical!!

## An overview of the

1. Strong functions: intelligent, proportional, switching, intelligent integration, all kinds of signal output.
2. Small size: the volume and weight are only about 35% of similar products.
3. High standard protection: IP67 high standard protection grade.
4. Reliable performance: bearings, electrical components and other key components are imported famous brand products.
5. beautiful and generous: aluminum alloy die-casting shell, fine and smooth, and can reduce electromagnetic interference
6. Precision abrasion resistance: worm gear output shaft integration of special copper alloy forging, high strength, good wear resistance.
7. Minimal backslip: the output shaft of the worm gear is integrated, avoiding the gap of key connection and high transmission accuracy.
8. Safety guarantee: pass 1500V withstand voltage test, fgrade insulated motor, safety is guaranteed.
9. Simple supporting: single-phase power supply is adopted, especially simple external connection line. AC380V is also our strength.
10. Easy to use: no refueling, no spot inspection, waterproof and anti-rust, installation at any Angle.
11. Protection device: double limit, overheat protection, overload protection (selection function).
12. Multiple speeds: full travel time 5 seconds, 10 seconds, 15 seconds, 30 seconds, 60 seconds, etc. (to be specified).
13. Integration: The intelligent control module is highly integrated into the body of the electric device, without external locator, etc.The opening and closing Angle of the gas limit.

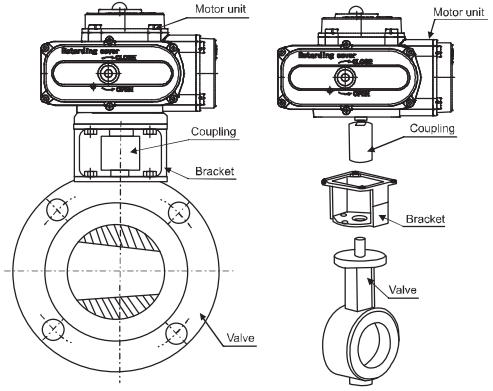
## Adjustment of electrical limit

By turning the switch adjusting wheel with a screwdriver, the Angle of the block can be adjusted to change the electricityThe opening and closing Angle of the gas limit.



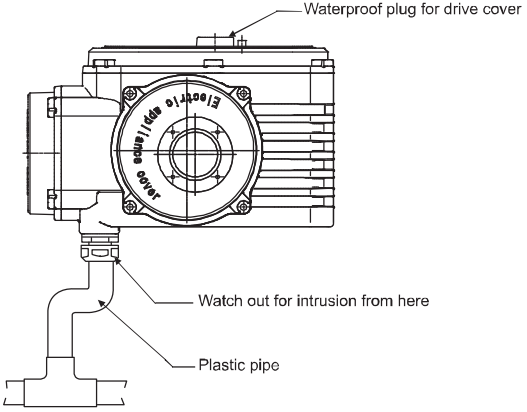
## Connection to valve

1. Turn the valve manually to make sure there are no abnormalities and turn the valve to the fully closed position.
2. Gently fasten the support on the valve with screws.
3. Slide the coupling on the valve stem of the valve.
4. Turn the electric device to the fully closed position.
5. Insert the output shaft of the electric device into the coupling.
6. Gently fix the electric device on the support with screws.
7. Turn the electric device manually to confirm that there are no eccentric, stuck and other abnormal conditions.
8. Tighten each screw on the support.
   Turn the electric device manually to confirm that there are no eccentric, stuck and other abnormal conditions.8. Tighten each screw on the support.

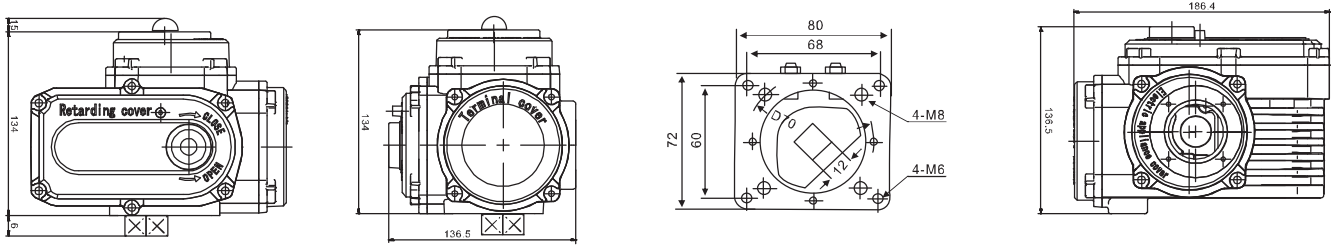



## Wiring Connections

1. Wiring Cables
(1) Please use the cable of 6-11 to ensure the safety and reliability of-the connection.
(2) Pass the cable through the cable clamp and fix the cable head on the terminal block according to the wiring diagram.
(3) Tighten the jacket of the wire lock to lock the cable.
(4) The cross-sectional area of a single line is greater than 1 square mm.
2. Wiring pipes: When using wiring pipes, waterproofing measures sh-ould be taken fully.As shown in the drawing, ensure that the electric device of this valve is higher than the wiring duct to prevent droplets from running along the wiringFlow into electric device.



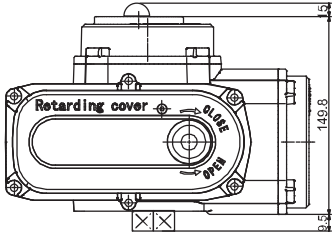
## Model 5 Outline drawing

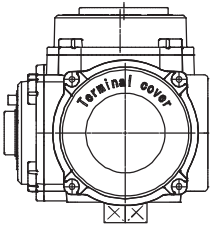


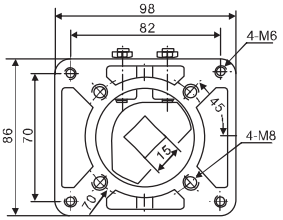

## Performance Parameter Table

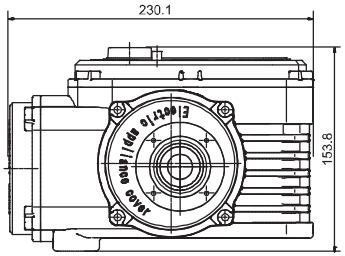
| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Power Supply | DC24V | AC24V | AC110V | AC220V | AC380V | Rotation angle | 0° ~90° ±5° |
| Motor Power | 13W | 15W | 15W | 15W | 15W | Control circuit | Switch/Passive Contact/Open Signal/Intelligent Adjustment |
| Rated current | 1.28A | 1.50A | 0.24A | 0.15A | 0.07A | Weight | 3kg |
| Rated current | 20N.M/50N.M | 50N.M | | | | Protection Class | IP67 |
| Action time | 10S/25S | 26S | | | | Installation orientation | Arbitrary Angle Installation |
| Insulation resistance | 100MΩ/250VDC | 100MΩ/500VDC | | | | Electrical interface | PG13.5 Nylon Waterproof Cable Connector |
| Voltage with-stand grade | 500VAC/1min | | 1500VAC/1min | | 1800VAC/1min | Ambient temperature | -30℃~+60℃ |

## 10/16 Profile



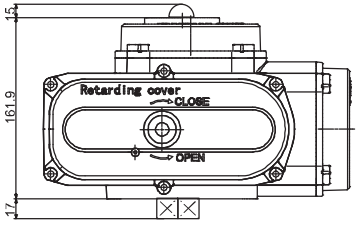



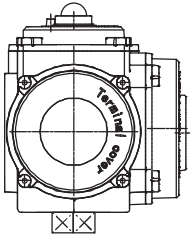



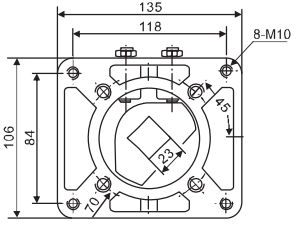

## Performance Parameter Table

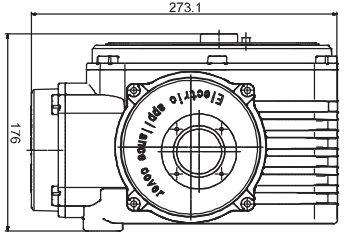
| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Power Supply | DC24V | AC24V | AC110V | AC220V | AC380V | Rotation angle | 0° ~90° ±5° |
| Motor Power | 25W | 30W | 30W | 30W | 30W | Control circuit | Switch/Passive Contact/Open Signal/Intelligent Adjustment |
| Rated current | 2.03A | 2.12A | 0.57A | 0.30A | 0.10A | Weight | 4.5kg |
| Output Torque | 100N.M | 160N.M/200N.M | | | | Protection Class | IP67 |
| Action time | 15S/30S | 30S/60S | | | | Installation orientation | Arbitrary Angle Installation |
| insulation resistance | 100MΩ/250VDC | 100MΩ/500VDC | | | | Electrical interface | PG13.5 Nylon Waterproof Cable Connector |
| Voltage with-stand grade | 500VAC/1min | | 1500VAC/1min | | 1800VAC/1min | mbient temperature | -30℃~+60℃ |

## 25/50 Profile



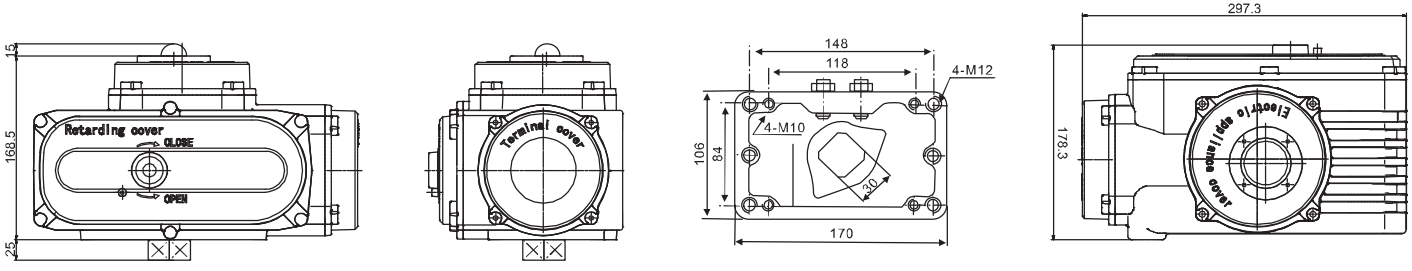




## Performance Parameter Table

| Power Supply | Type 25 | | | Type 50 | | | Rotation angle | 0° ~90° ±5° |
|---|---|---|---|---|---|---|---|---|
| | DC24V | AC220V | AC380V | DC24V | AC220V | AC380V | | |
| Motor power | 50W | 60W | 40W | 70W | 90W | 90W | Control circuit | Switch type / passive contact type / opening signa type / intelligent regulation type |
| Rated current | 3.57A | 0.80A | 0.29A | 5.13A | 1.00A | 0.35A | Action time | 15S/30S |
| Output torque | 250N.M | | | 500N.M | | | Protection level | IP67 |
| Total weight | 7.5kg | | | 8.2kg | | | Installation orientation | Installation at any angle |
| Insulation resistance | 100MΩ 250VDC | 100MΩ/500VDC | | 100MΩ 250VDC | 100MΩ/500VDC | | Electrical interface | Pg13.5 nylon waterproof cable joint |
| Withstand voltage level | 500VAC 1min | 1500VAC 1min | 1800VAC 1min | 500VAC 1min | 1500VAC 1min | 1800VAC 1min | Ambient temperature | -30℃~+60℃ |

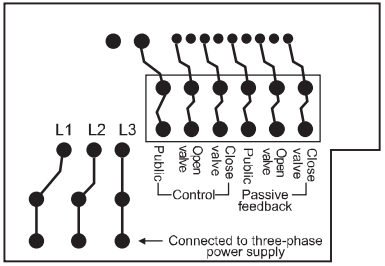
## 100 / 200 Outline drawing

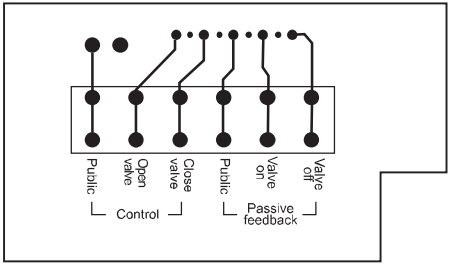


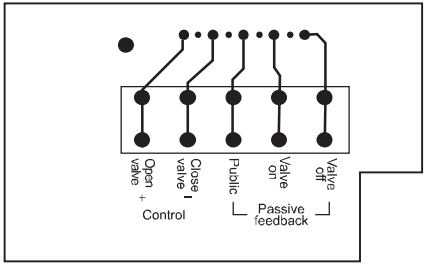

## Performance parameter table

| Power Supply | Type 100 | | Type 200 | | Rotation angle | 0° ~90° ±5° |
|---|---|---|---|---|---|---|
| | AC220V | AC380V | AC220V | AC380V | | |
| Motor power | 120W | 90W | 140W | 100W | Control circuit | Switch type / passive contact type / opening signa type / intelligent regulation type |
| Rated current | 1.20A | 0.44A | 1.20A | 0.48A | Total weight | 12kg |
| Output torque | 1000N.M | | 2000N.M | | Protection level | IP67 |
| Action time | 60S | | 100S | | Installation orientation | Installation at any angle |
| Insulation resistance | 100MΩ/500VDC | | 100MΩ/500VDC | | Electrical interface | Pg13.5 nylon waterproof cable joint |
| Withstand voltage level | 1500VAC/1min | 1800VAC/1min | 1500VAC/1min | 1800VAC/1min | Ambient temperature | -30℃~+60℃ |

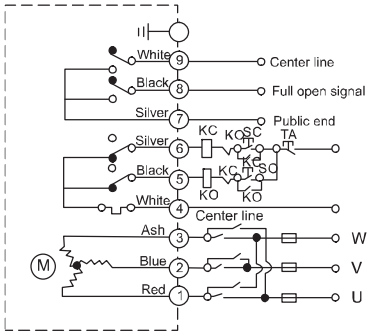
## Common circuit diagrams

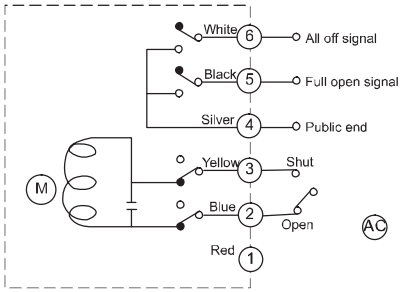


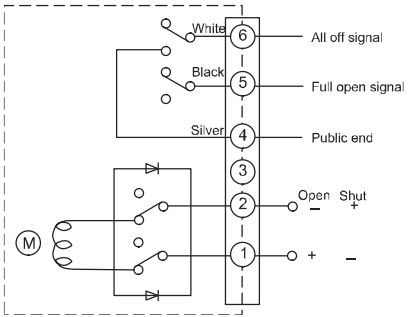




External AC contactor commutation is required

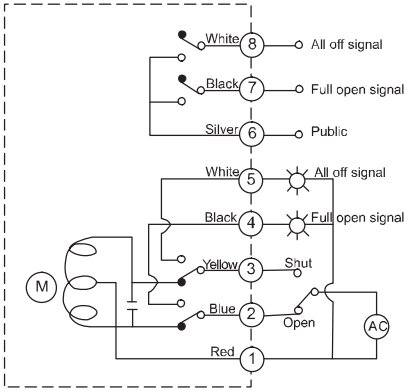


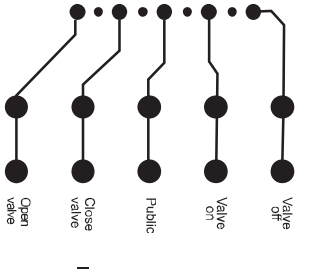



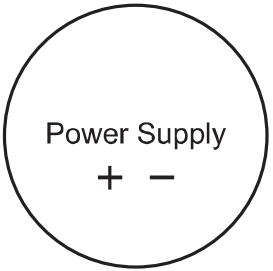

☐ Three phase AC (AC380V) control type ☐ With passive contact type (s type) (AC220 V, 24 V, 110 V) ☐ DC motor (DC24 V, 110 V, 220 V) control type

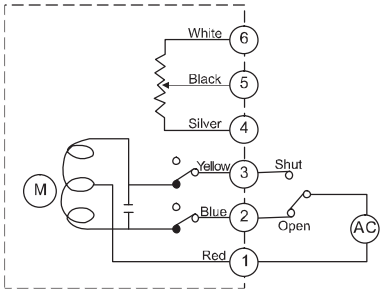
## Power off reset diagram



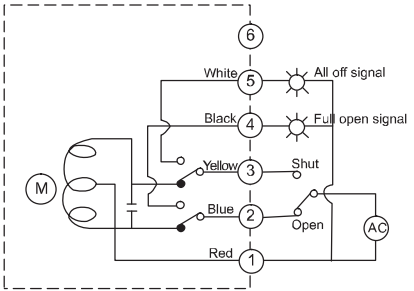

☐ Switch type + passive contact type (AC220 V, 24 V, 110 V)



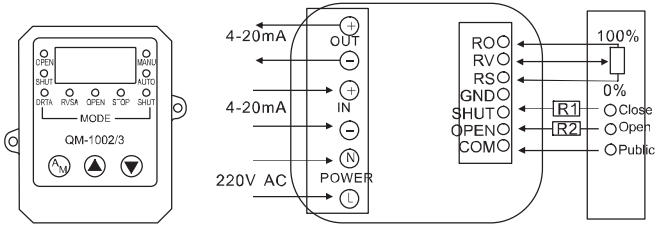

☐ With resistance signal(1K、3K、5K)Output type (R type)




☐ Switch type (AC220 V, 24 V, 110 V)

## Performance parameter

1. Input and output signal: 4 ~ 20mA, 0 ~ 10V, 1 ~ 5V, switch, MODBUS field bus
2. Actuator position feedback signal: 500 Ω ~ 10K Ω potentiometer
3. Input impedance: 180 Ω
4. Positioning accuracy: 0.1% ~ 3.0%
5. Positive and negative action mode can be set
6. When the control signal is interrupted, the valve can be fully opened, stopped and fully closed
7. Over temperature protection function, over 80 ℃ stop adjustment
8. Two valve position calibration methods are provided. The automatic mode module automatically calibrates the zero position and full position, and automatically avoids the electrical protection point to prevent oscillation. The manual mode can calibrate the zero position and full position at any position, and the full position is required to be greater than zero position. Generally, the fully closed and fully open positions are taken as zero and full position.
9. Judgment function of locked rotor and oscillation
10. The precision self-adjusting function can automatically reduce the positioning accuracy in case of oscillation. The parameter F0 = 000.




## Panel description

| | | | |
|---|---|---|---|
| Ginsengnumber | 1 | LED Digital tube | Valve opening, setting opening, temperature, fault code, setting parameters |
| Shapestate | 2 | OPEN | Open the valve |
| | 3 | SHUT | Close the valve |
| | 4 | MANU | Manual (local) |
| | 5 | AUTO | Automatic (remote control) |
| Modeltype | 6 | DRTA | Positive action mode, input signal corresponding to valve opening, 4mA full position, 20mA zero position |
| | 7 | RVSA | Reverse action mode, input signal corresponding to valve opening, 4mA zero position, 20mA full position |
| | 8 | OPEN | Full open when input signal is interrupted |
| | 9 | STOP | Stop when input signal is interrupted |
| | 10 | SHUT | All off when input signal is interrupted |
| Presskey | 11 | A/M | Manual and automatic switch key, parameter enter modify and switch key |
| | 12 | ▲ | The value increase key, the automatic mode is the display content switch key, and the manual mode is the valve opening key |
| | 13 | ▼ | Numerical value decrease key, automatic mode is display content switching key, and manual mode is valve closing key |

## Setting parameter table

| Para-meter | Display value | Factory value | Meaning |
|---|---|---|---|
| F0 | 00X.0 | 1 | Using electromagnetic brake rotor to achieve the purpose of rapid braking and accurate adjustment, x = 1 allows electronic braking, x = 0 does not allow electronic braking |
| | 000.X | 0 | When x = 0, the positioning accuracy is not allowed to be changed, but the reset time is allowed to be changed. When x = 1, the positioning accuracy is allowed to be changed, and the reset time is not allowed to be changed |
| F1 | 00X.0 | 1 | The relationship between signal size and valve opening, x = 0 is positive, x = 1 is negative |
| | 000.X | 2 | When the signal is interrupted, the actuator action mode x = 1 (on) x = 2 (stop) x = 3 (close) switch type X = 0 - remote control self holding,State normally closed x = 1-remote control self holding, state normally open x = 2-remote control non self holding, state normally closed x = 3-remote control non self holding, state normally open |
| F2 | XXX.X | 0.0 | Lower limit of control output |
| F3 | XXX.X | 100.0 | Upper limit of control output |
| F4 | 00X.X | 0.4 | The actual accuracy is x.x/100 |
| F5 | XXX.X | 0.5 | 0.5, save the setting to exit, and 3.1 is the actuator opening calibration |
| F6 | XXX.X | | To calibrate the actuator zero position, press the A / M key to confirm when the specified zero position is reached, and then enter F7 automatically |
| F7 | XXX.X | | When the actuator reaches the specified full position, press the A / M key to confirm,Automatically enter F5 = 0.5, press the-A / M key again to save the calibration value and exit the setting mode. |

## Digital window display content

| Serial number | Show contents | Window display prompt |
|---|---|---|
| 1 | Valve opening | Nothing |
| 2 | Input signal amplitude | Display in the upper left cornerl |
| 3 | Internal temperature | Display in the lower left cornerl |

## Parameter setting

Press and hold the A / M key for more than 5 seconds to enter the setting mode, adjust the settings according to the requirements, enter the F5 menu item, adjust the F5 value to 0.5, press the A / M key to store the settings and exit the setting mode.

When the general user mistakenly changes the settings and cannot be restored, after the equipment is powered off, press and hold the A / M key to power on again to restore the factory settings.

## Error code

| Errorcode | Meaning |
|---|---|
| E-01 | In the 4-20mA signal mode, if it is lower than 3.0ma, it will be judged that the signal is interrupted and the code will be displayed. 0 ~ 10V- has no such function |
| E-03 | Potentiometer wiring fault |
| E-05 | Unable to locate, repeatedly oscillate, check input signal or angle feedback signal is unstable or the positioning accuracy set is too high |
| E-06 | Turn off direction stalling |
| E-07 | Open direction stall |
| E-08 | Overtemperature |

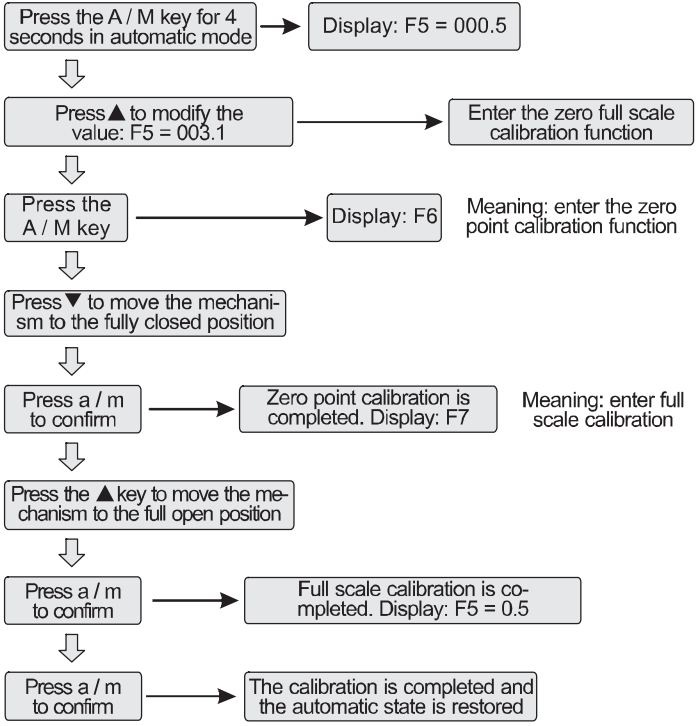
## Zero full calibration

1. Automatic mode: press and hold the A/M key and {key at the same time, and the positioner will automatically calibrate the zero position and full position.
2. Manual mode: press and hold the A/M key for more than 5 seconds to enter the setting mode, continuously press the A/M key to enter the F5 menu item, press ■} to adjust the F5 value to 3.1, press the A/M key to enter the F6 menu item, press to adjust the zero angle, and then press the A/M key to confirm the zero position, and then enter the F7 menu item Adjust the full position angle. After the angle is satisfied, press the A /M key to confirm, enter the F5 menu item, adjust the F5

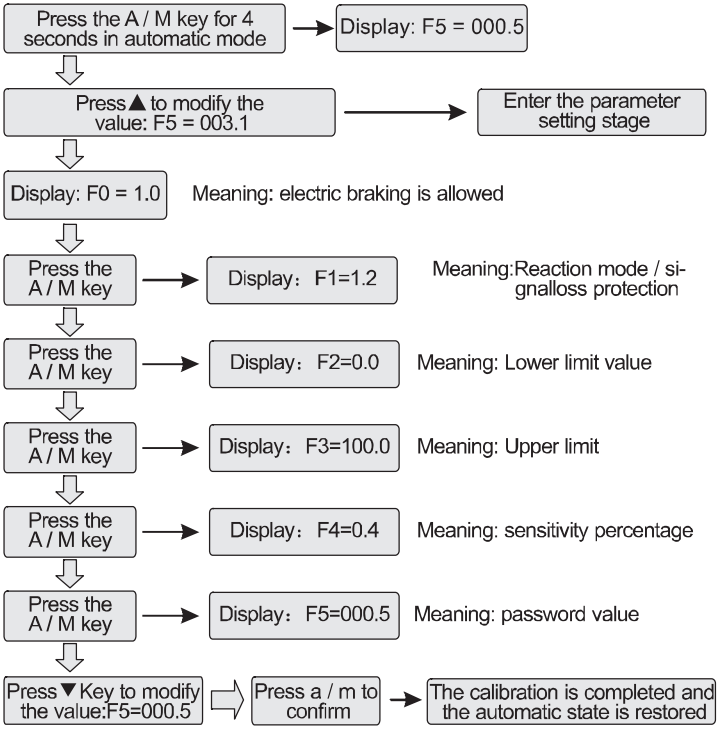
## Adjustment steps

1. Simple automatic calibration method (* this calibration method requires the actuator to have electrical limit or mechanical limit): in the automatic state, press and release the A/M key at the same time to start the automatic calibration. The actuator moves towards the small opening direction, and it is confirmed as the zero position (corresponding valve position is 0.0) after the action reaches the minimum opening limit. After the zero position is determined, the actuator moves towards the maximum opening The full position (corresponding valve position is 100.0) is determined after the judgment of the maximum opening limit. After the calibration is completed, it returns to the automatic state, and the calibration results are saved automatically.

2. Free calibration method (as shown in the figure)




## Other parameter settings



## Related knowledge

1. Position adjustment of angle feedback potentiometer: when the positioner is assembled, the angle feedback potentiometer should be ensured to match with the actual opening of the actuator. Method 1: adjust the actuator to the middle position, cut off the power and measure the resistance value of the middle point and the two ends of the potentiometer respectively. If the difference is too large, please adjust the middle point position of the potentiometer to make the resistance at both ends approximately the same. Method 2: adjust the actuator to the half open position, connect the positioner module and adjust the potentiometer gear to make the angle display about 50%.
2. About the application of microswitch: if the microswitch acts when the zero position is full, the electronic braking function will be invalid, which will affect the positioning accuracy and sometimes cause oscillation. Therefore, for the adjustable electric actuator, the microswitch should only play the role of electrical protection, and should not be within the working stroke of zero position and full position. Therefore, users should avoid the action point of microswitch when manually calibrating the full zero position of valve, and the automatic calibration mode will automatically avoid the action point of microswitch.
3. PLC or DCS system in the application of electric actuator need to pay attention to the problem: PLC or DCS system input and output module of the internal relay is a small power relay, its contact can not withstand the voltage of 220 V and more than 1 a current, so when using it to control ordinary switch type actuator, we should transfer a power relay at the control end, or use our company's weak current signal control This type of actuator can also be equipped with control status and fault alarm output module or synchronous switch in place signal output module.
4. 24 V actuator in the use of easy problems: the characteristics of the 24 V actuator is working at a safe voltage, good safety, but the working current than the 220 V or 380 V actuator many times, if the cross-sectional area of the field power supply line is not enough, it may cause the line voltage drop of the actuator is too large to make the actuator can not work normally, and the built-in control module will also reset Therefore, when using the 24 V actuator, the theoretical calculation must be based on the motor starting current when laying the power line.
5. The application characteristics of Fieldbus actuator: each device of ordinary adjustable electric actuator needs 4 lines, 2 for control signal and 2 for feedback signal, and 40 lines for 10 devices. The fieldbus only needs two lines to control multiple field bus actuators. The bus can not only transfer control information, but also return the status information, setting information and fault information of each device. Due to the elimination of multiple A / D and D / a conversion links, the control accuracy is also improved. Therefore, the field bus type electric actuator is the future development direction.
6. About outdoor intelligent integral actuator:

(1) It adopts non-invasive design, adopts infrared setting device for personalized setting, adopts reliable magnetic conduction field knob for local operation, abandons the traditional through knob design or waterproof rubber button design, so as to ensure the waterproof performance and durability of the equipment and meet the outdoor application conditions.

(2) Multi function display window with rich contents, users can master the basic setting parameters, operation status and fault alarm information of the equipment at any time.

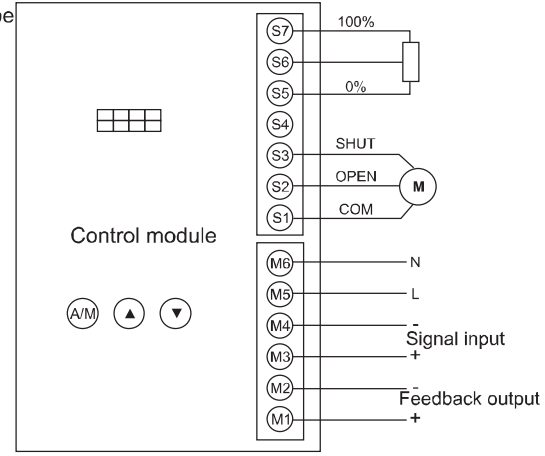
(3) Equipped with infrared remote control, users can personalize the equipment according to the needs of the site without opening the equipment, realizing the non-invasive setting and patent structure. The end user only needs to open the wiring side cover, and the user can use the infrared remote control to open and close the valve non-contact.

(4) Three phase power supply automatic phase identification, automatic correction, on-site installation does not need to care about the phase sequence, to avoid equipment damage due to installation reasons, lack of phase protection, protect motor safety.

(5) Complete fault detection function, after the equipment detects a fault, it will stop working to protect the equipment and the whole system. In addition to displaying the fault code through the display screen, it also sends an alarm to the control system through the passive contact. The built-in 4 passive contact output can output the open to position, close in place, control mode (field / remote) and fault alarm signals.

## Wiring description of built-in module

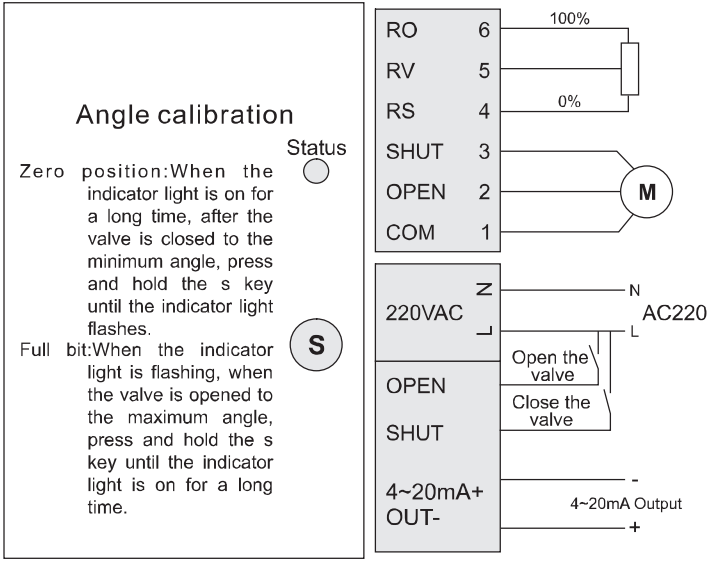
A、Regulatory type




## Wiring instructions

1. The control module is divided into three models of 220 VAC / 24 VAC / 24 VDC. Please pay attention to the polarity of the power supply for the model of 24 VDC, which is customized according to the user's requirements.
2. The control signal and feedback signal are divided into four specifications: 4 ~ 20mA / 0 ~ 10V / 1 ~ 5V / 0 ~ 5V, which are customized according to the user's requirements.
3. M5 and M6 connected to power supply
4. M1 and M2 are terminals for valve position feedback signal.
5. M3 and M4 are control signal terminals.

## B. QM-1001B valve position transmitter

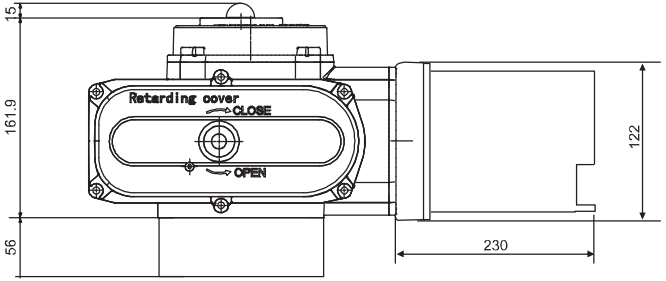



## Wiring instructions

1. When the external potentiometer of the valve position transmitter rotates to the middle point, the LED will flash, and the user can adjust the angle of the potentiometer drive gear by this function.
2. AC220 V drive is used to open and close the valve

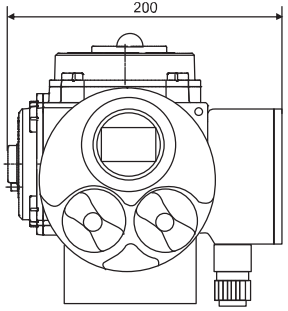
## Performance parameter

1. Input and output signals: 4 ~ 20mA, 0 ~ 10V, 1 ~ 5V, switch, MODBUS, PROFIBUSfield bus
2. Working power supply:380VAC、220VAC、110VAC、24VAC、24VDC
3. Actuator position feedback signal: 500 Ω ~ 10K Ω potentiometer or encoder
4. Input impedance: 180 Ω
5. Positioning accuracy: up to 0.4%
6. Working environment: temperature - 25 ℃ ~ + 50 ℃, humidity ⩽ 95%
7. Protection grade: IP67




## Panel description

| | | | |
|---|---|---|---|
| ginseng number | 1 | LED Digital tube | Valve opening, setting opening, fault code, setting parameters |
| shapestate | 2 | Open the valve | Open the valve + flicker, the valve is always on when it is fully open |
| | 3 | Close the valve | Close the valve + flicker, the valve is always on when it is fully closed |
| | 4 | Scene | Local manual control |
| | 5 | Distance | Remote control |
| Modeltype | 6 | Just | Positive action mode, input signal corresponding to valve opening, 4mA full position, 20mA zero position |
| | 7 | Inverse | Reverse action mode, input signal corresponding to valve opening, 4mA zero position, 20mA full position |
| | 8 | open | Full open when input signal is interrupted |
| | 9 | Stop | Stop when input signal is interrupted |
| | 10 | Shut | All off when input signal is interrupted |
| Spinbutton | 11 | Mode sel-ectionSel-ect knob | It is used for the selection of equipment operation mode |
| | 12 | On off va-lveknob | On site opening and closing valves and angle calibration in stop mode |




## Infrared remote control

| | | | |
|---|---|---|---|
| Remote control button | 1 | Set up | The parameters enter the modify and switch keys, and the mode selection knob is valid in the stop mode |
| | 2 | ▲ | Value increase key, mode selection knob, in stop mode effective |
| | 3 | ▼ | Value decrease key, mode selection knob, in stop mode effective |
| | 4 | Open the valve | Remote control to open valve, mode selection knob available on site or remotely |
| | 5 | Close the valve | Remote valve closure, mode selector knob available on site or remotely |
| | 6 | Stop it | Remote control stop, mode selector knob available on site or remotely |
| | 7 | Remote control | Set the device in remote control mode after stopping remote control |

Description: Remote control can be used to switch valves in field mode and remote control mode to end remote control opening.When the valve is closed, the remote control button is used to rest-ore the device to remote control mode.

## Setting Parameter Table

| Para-meter | Display Value | Factory Value | Meaning |
|---|---|---|---|
| F0 | 00X.0 | 1 | Electro-braking is allowed for X=1 and not X=0 for the purpose of fast and precise braking adjustment by using the electro-magnetic brake rotor |
| | 000.X | 0 | X=0, positioning accuracy is not allowed to be changed, but reset time is allowed to be changed<br>X=1 allows to change the positioning accuracy, not to change the reset time |
| F1 | 00X.0 | 1 | Signal size as a function of valve opening<br>X=0 is positive and X=1 is negative |
| | 000.X | 2 | Actuator action mode X = 1 (on) X = 2 (stop)<br>X = 3 (closed) when signal is interrupted |
| F2 | XXX.X | 0.0 | Lower limit value of local control |
| F3 | XXX.X | 100.0 | Upper limit value of local control |
| F4 | 00X.X | 0.4 | Positioning accuracy, actual accuracy X.X/100 |
| F5 | 1.2 | 0.3 | 000.X Signalless Open Valve (2-wire system is valid)<br>001.X Signalless Shutdown Valve (2-wire system is valid)<br>00X.3 Switched Three-wire Control<br>00X.2 Switched Two-wire Control<br>Two-wire switching control uses remote switching control signals common and open terminals |
| | 1.4 | 1.0 | 000.X Remote Switch Control Signal Non-Self-Holding<br>001.X Remote Switch Control Signal Self-Holding<br>00X.0 adjustable type<br>00X.1 switch type |
| | 0.0 | | Reset |
| | 0.1 | | Factory Initialization, Use with Care<br>(Angle Re-Calibration Required) |
| | 0.5 | 0.5 | Save Settings and Exit Parameter Setting Mode |

Note: The adjustable/switching type corresponds to the corresponding parameters, some of which may not be meaningful.Adjustable typeWhen the analog signal of 4~20mA is interrupted, it will automatically switch to switch type, and 0~10V has no such function.

## Digital window display content

| Serial number | Show contents | Window display prompt |
|---|---|---|
| 1 | Valve opening | Nothing |
| 2 | Input signal amplitude | Upper left corner display \| Rotary switch valve knob in remote mode toggles to display valve opening and given signal amplitude |

## Error code

| error code | Meaning |
|---|---|
| E-01 | In 4-20mA signal mode, if the signal is interrupted below 3.0mA, the code will be displayed. 0-10V has no such function. Please connect mA in series with the input circuit to check whether the control current signal is normal. |
| E-03 | Angle is out of normal value, please re-calibrate the angle, if not normal check potentiometer |
| E-05 | Unable to locate, oscillates repeatedly, checks input signal or angle feedback signal unstable or sets positioning accuracy too high |
| E-06 | When closing the direction of rotation, check whether it is blocked or not, and check whether the potentiometer is in the dead zone. When calibrating the angle, the dead zone of the potentiometer should be avoided. The alarm message can be cleared by rotating the switch valve knob in field mode and by remotely reversing the direction control signal. |
| E-07 | Open direction block, please check whether it is blocked, and check whether the potentiometer is in the dead zone. When calibrating the angle, the dead zone of the potentiometer should be avoided. The alarm message can be cleared by rotating the switch valve knob in field mode and by remotely reversing the direction control signal. |
| E-09 | Phase-out of three-phase power supply |
| E-10 | Simultaneous presence of remote control switch signals |

## Positioner and actuator assembly

Fit limit switch and potentiometer, manually adjust actuator to half-open position, connect power supply and motor as shown above, position mode selection knob on site, twist switch valve knob to observe actuator steering, if wrong, adjust motor wire to correct direction of action.Connect the internal signal to the external terminal as shown.

## Precautions in Assembly and Commissioning

1. The mechanical limit must not limit the movement of the valve within the range of its travel.
2. Open and close in position microswitches and open and close torque microswitches shall not be triggered during valve travel (except feedback output microswitches). Full consideration shall be given to the torque increase factor when butterfly valves are closed.
3. The potentiometer leaves a moderate margin outside the valve travel and can not enter the measurement invalid zone (dead zone) of the potentiometer.
4. The lead from the control panel to the external terminal must be connected reliably.
5. All parameters are set correctly.

## Intelligent integrated control circuit diagram

The following terminal definitions describe the maximum possibilities offered by the product and allow the user to choose between them when ordering the

## Off-position and open-position calibration

**Gate calibration:**

The mode selection knob (red) is placed in the stop position, the switch valve knob (black) is turned to the close position for more than 5 seconds to enter the closed calibration state, the digital display window displays "L" and flashes twice, then "L" is displayed alternately with the output value of 12-bit encoder (0-4095).The mode selection knob (red) switches to the field position and turns the switch valve knob (black); after adjusting the valve to the position to be set to closed, the mode selection knob (red) switches to the stop position and the off position is calibrated.

**Open position calibration:**

The mode selection knob (red) is placed in the stop position, the switch valve knob (black) is turned to the open position and remains in the open calibration state for more than 5 seconds. The digital display window displays "H" and flashes twice, then "H" is displayed alternately with the output value of 12-bit encoder (0-4095).The mode selection knob (red) switches to the field position and turns the switch valve knob (black); after adjusting the valve to the position to be set to open, the mode selection knob (red) switches to the stop position and the open position is calibrated.

**In particular, the order of opening and closing is arbi-**

## Parameter Settings

The mode selection knob (red) is placed in the stop position and the on-off valve knob (black) is briefly triggered in the open position for 3 times to set the entry number mode.

At this point, the action of the switch valve knob (black) corresponds to the increase key and the de crease key, and the function is to change the parameter option or increase or decrease the value; the mode selection knob (red) corresponds to the function of "confirming and entering the next parameter item" from stop to field and the mode selection knob (red) corresponds to the function of "returning to the previous parameter item" from stop to remote and then back to stop.Refer to the "4.Set Parameter Table" for parameter setting. After setting, go to the "F5" menu and save the parameter with F5=0.5 and exit.

Note: In parameter setting mode, mode selection knob (red) stays in field or remote position for more than 5 seconds will exit the parameter setting mode and the previously made parameter changes will not be saved.

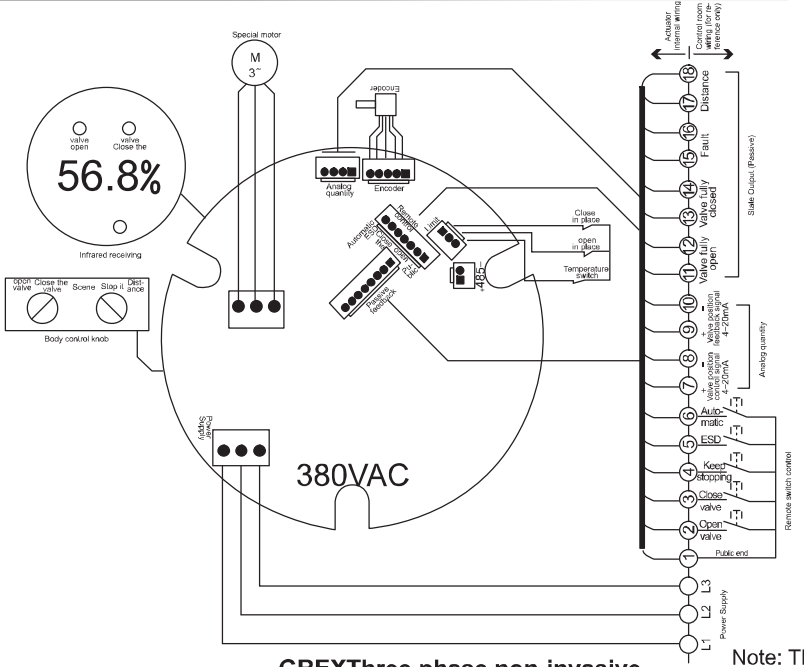
## Infrared remote control setting

The mode selection knob is placed in the stop position and the parameter setting mode is entered by pressing the "Set" button of the infrared remote control.

At this time, it corresponds to the increase key, the decrease key, the function is the change of parameter option or the increase or decrease of value, and the "setting" key corresponds to the confirmation and entering of the next parameter item.

Note: In parameter setting mode, if no key is pressed for 30s, the device will automatically exit the setting mode and the previously made parameter modifications will not be saved.

## Internal electrical schematic diagram

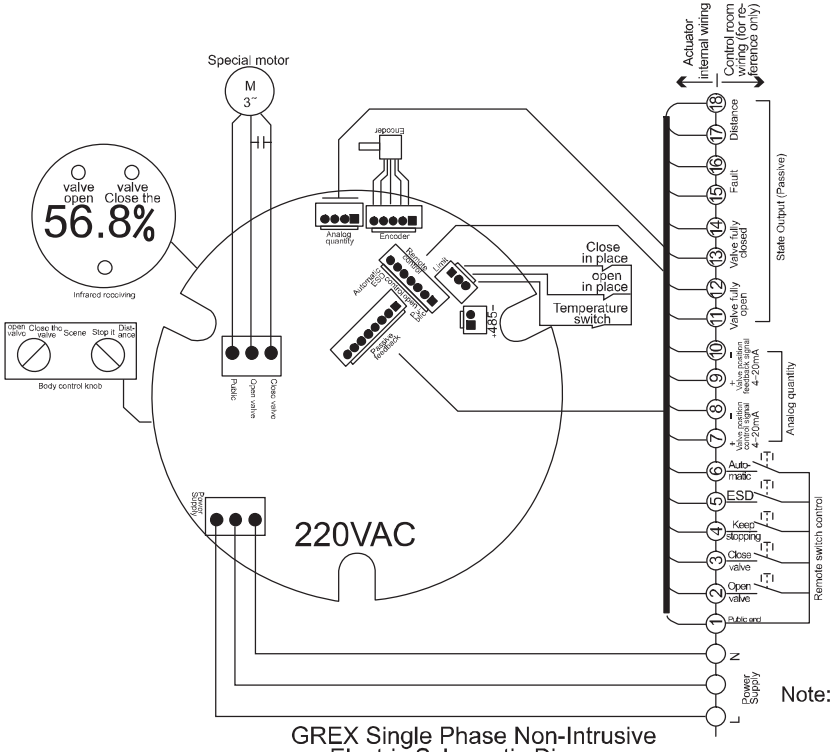



**GREXThree phase non-invasive electrical schematic diagram**

Explain:

1. The panel display angle is only a schematic
2. Terminal line sequence is based on random assignment
3. RS485 bus is optional and needs to be customized by users.

Note: The status output can withstand 250VAC/1A.Remote switch signals must not blindly access strong electrical signals higher than 24V. If high voltage strong electrical signal control is required, please customize it.

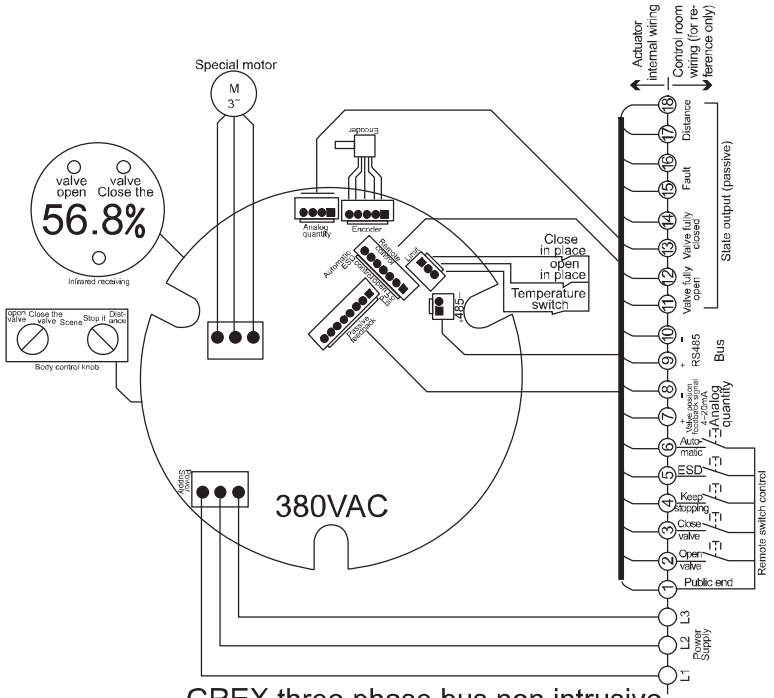



GREX Single Phase Non-Intrusive Electric Schematic Diagram

Explain:

1. The panel display angle is only a schematic
2. Terminal line sequence is based on random assignment
3. RS485 bus is optional and needs to be customized by users.

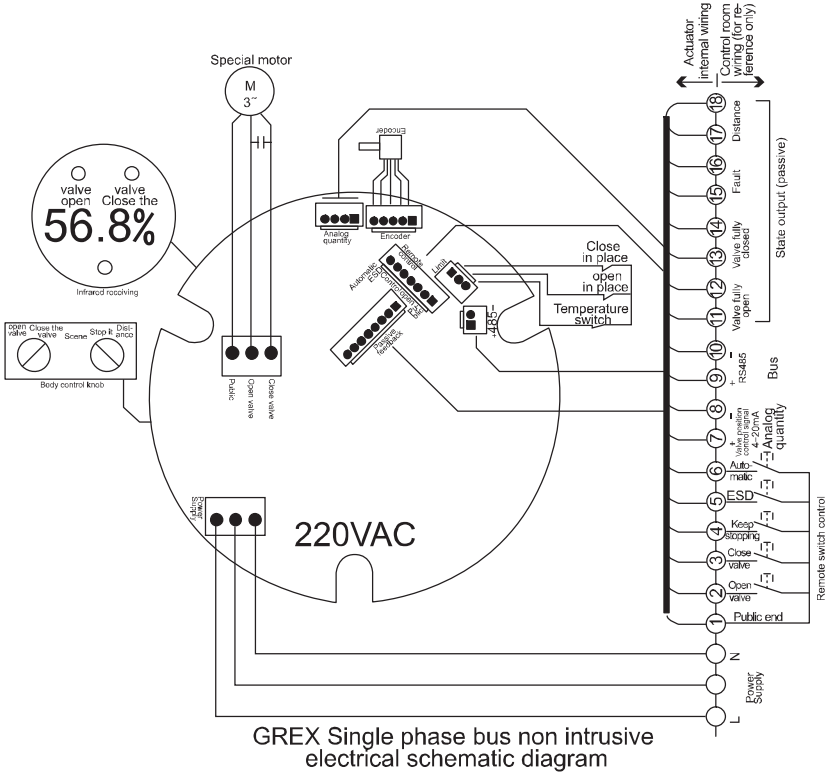
Note: The status output can withstand 250VAC/1A.Remote switch signals must not blindly access strong electrical signals higher than 24V. If high voltage strong electrical signal control is required, please customize it.




GREX three phase bus non intrusive electrical schematic diagram

Explain:

1. The panel display angle is only a schematic
2. Terminal line sequence is based on random assignment
3. RS485 bus is optional and needs to be customized by users.




GREX Single phase bus non intrusive electrical schematic diagram

Explain:

1. The panel display angle is only a schematic
2. Terminal line sequence is based on random assignment
3. RS485 bus is optional and needs to be customized by users.

## Assembly of positioner and actuator mechanism

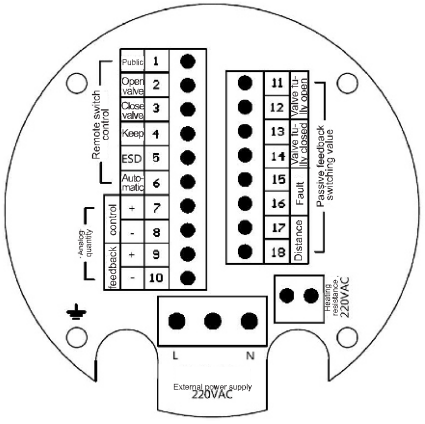
Install the limit switch and encoder, manually adjust the actuator to the half open position, connect the power supply and motor according to the above figure, set the mode selection rotation to the field position, turn the on-off valve knob to observe the actuator steering, if the direction is wrong, adjust the motor line to make it move in the correct direction. Transfer the internal signal to the external terminal according to the diagram.

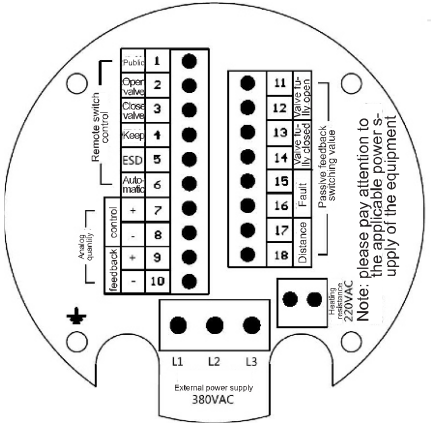
Precautions in assembly and commissioning: (1) the mechanical limit shall not limit the movement of the valve within the stroke range of the valve; (2) the encoder shall be installed, fixed and rotated reliably; (3) the wire leading from the control board to the external terminal shall be reliably connected; (5) all parameters shall be set correctly.

**Special reminder:**

1. The terminal signal position shall be subject to the terminal board installed on the actual product.
2. The remote switch signal is controlled by passive contact or DC24 V or AC24 v. do not connect to the voltage exceeding 24 V, otherwise the equipment will be burned, and the strong current control model can be specially customized.
3. Two wire switch control uses remote switch value to control signal common and valve opening terminals 1 and 2.
4. The power supply voltage of single-phase model may be 220 VAC / 110 VAC / 24 vac. Only 220 VAC is taken as an example in the figure.
5. Valve open, valve close, fault and remote control status signals are passive contact output, which can withstand 250V5A.

## Terminal definition



## Open and close calibration

**Close position calibration:**

Set the mode selection knob (red) to the stop position, turn the on / off valve knob (black) to the closing position for more than 5 seconds, and enter the closed position calibration state. The digital display window displays "L" and flashes twice, then "L" and 12 bit encoder output value (0-4095) are displayed alternately. The mode selection knob (red) is switched to the field position. After turning the on-off valve knob (black) to set the valve to the off position, the mode selection knob (red) is switched to the stop position, and the closing position calibration is completed.

**Open position calibration:**

Set the mode selection knob (red) to the stop position, turn the on-off valve knob (black) to the closing position for more than 5 seconds, and enter the open position calibration state. The digital display window displays "H" and flashes twice, then "H" and 12 bit encoder output value (0-4095) are displayed alternately. The mode selection knob (red) is switched to the field position. After turning the on-off valve knob (black) to adjust the valve to the open position, the mode selection knob (red) is switched to the stop position, and the open position calibration is completed.

In particular, the calibration sequence of open and close positions is arbitrary.

## Parameter setting

Set the mode selection knob (red) to the stop position. In 3 seconds, the on / off valve knob (black) will be triggered at the opening position for 3 times to enter the parameter setting mode.

At this time, the action of the on-off valve knob (black) corresponds to the increase key and decrease key, and the function is to change the parameter options and increase or decrease the value; the mode selection knob (red) from stop to field and then back to stop corresponds to the function of "confirm and enter the next parameter item"; the mode selection knob (red) from stop to remote and then back to stop corresponds to the function of "return to the previous parameter item". Set the parameters according to "4. Set parameter table". After setting, enter the "F5" menu, save the parameters with F5 = 0.5 and exit.

Note: in the parameter setting mode, if the mode selection knob (red) stays at the field or remote position for more than 5S, the parameter setting mode will be exited and the previous parameter modification will not be saved.

## Bytk Modbus communication data parameter table

| Serial number | Explain | Register address | Data range | Measurement (measurement range) | Operation authority | Remarks | distinguish |
|---|---|---|---|---|---|---|---|
| 1 | Valve stop control | 00000 | 0/1 | ~/Stop | Read / write | Coil, function 1 reads single coil, function 5 forces single coil | Bit variable |
| 2 | Valve closing control | 00001 | 0/1 | ~/Close the valve | Read / write | | |
| 3 | Valve opening control | 00002 | 0/1 | ~/Open the valve | Read / write | | |
| 4 | Valve ESD control | 00003 | 0/1 | ~/ESD control | Read / write | | |
| 5 | Valve intermediate state | 00004 | 0/1 | ~/In the middle | Read-only | Read only input discrete quantity, function 1,2 read | |
| 6 | Valve fully closed | 00005 | 0/1 | ~/Complete clearance | Read-only | | |
| 7 | Valve fully open | 00006 | 0/1 | ~/Full open | Read-only | | |
| 8 | Actuator overheating | 00007 | 0/1 | ~/Overheating | Read-only | | |
| 9 | Actuator phase failure | 00008 | 0/1 | ~/Phase loss | Read-only | | |
| 10 | Actuator over torque | 00009 | 0/1 | ~/Over torque | Read-only | | |
| 11 | Actuator closing torque | 00010 | 0/1 | ~/Turn off torque | Read-only | | |
| 12 | Angle overrun | 00011 | 0/1 | ~/Angle overrun | Read-only | | |
| 13 | Comprehensive alarm of actuator | 00012 | 0/1 | Normal / combined fault | Read-only | | |
| 14 | Actuator operating mode | 00013 | 0/1 | Local / remote | Read-only | | |
| 15 | Valve ESD status | 00014 | 0/1 | ~/Close the valve | Read-only | | |
| 16 | Valve ESD status | 00015 | 0/1 | ~/Open the valve | Read-only | | |
| 17 | Valve ESD status | 00016 | 0/1 | ~/Reservation | Read-only | | |
| 18 | The valve is closing | 00017 | 0/1 | ~/Closing | Read-only | | |
| 19 | The valve is opening | 00018 | 0/1 | ~/Opening | Read-only | | |
| 1 | Valve stop control | 00000 | 1 | ~/Stop | Read / write | Read write hold register, function 3 read register, function 6 write single register | Double byte variable |
| | Valve closing control | 00000 | 2 | ~/Close the valve | Read / write | | |
| | Valve opening control | 00000 | 3 | ~/Open the valve | Read / write | | |
| | Valve ESD control | 00000 | 4 | ~/ESD control | Read / write | | |
| | Valve ESD reset | 00000 | 0 | ~/ESD reset | Read / write | | |
| 2 | Valve control | 00001 | 0~1000 | 0~100.0% | Read / write | | |

| Serial number | Explain | Register Address | Data range | Measured value (measuring range) | Operating Rights | Remarks | Distinguish |
|---|---|---|---|---|---|---|---|
| 3 | Valve opening | 00002 | 0~1000 | 0~100.0% | Read Only | Read-Only Input Register, Function 3,4 Read | Double byte variable |
| 4 | Valve Intermediate Status | 00003.0 | 0/1 | ~/middle | Read Only | | |
| | Valve fully closed | 00003.1 | 0/1 | ~/Total closure | Read Only | | |
| | Valve fully open | 00003.2 | 0/1 | ~/Fully open | Read Only | | |
| | Actuator overheating | 00003.3 | 0/1 | ~/Overheating | Read Only | | |
| | Actuator Phase Loss | 00003.4 | 0/1 | ~/Phase absence | Read Only | | |
| | Actuator overrunning torque | 00003.5 | 0/1 | ~/Opening Torque | Read Only | | |
| | Actuator switching torque | 00003.6 | 0/1 | ~/Off Torque | Read Only | | |
| | Angle overrun | 00003.7 | 0/1 | ~/Angle overrun | Read Only | | |
| | Actuator Comprehensive Alarm | 00003.8 | 0/1 | Normal/Comprehensive Failure | Read Only | | |
| | Actuator operating mode | 00003.9 | 0/1 | Local/remote | Read Only | | |
| | Valve ESD status | 00003.10 | 0/1 | ~/Close the valve | Read Only | | |
| | | 00003.11 | 0/1 | ~/Open Valve | Read Only | | |
| | | 00003.12 | 0/1 | ~/Holding | Read Only | | |
| | Valve closing | 00003.13 | 0/1 | ~/Closing | Read Only | | |
| | Valve is opening | 00003.14 | 0/1 | ~/On | Read Only | | |
| | Spare | 00003.15 | 0/1 | | Read Only | | |
| 5 | Actuator protection torque (thrust) | 00004 | 0~65535 | 0~65535Nm(N) | Read Only | | |
| 6 | Actuator current maximum torque (thrust) | 00005 | 0~65535 | 0~65535Nm(N) | Read Only | | |
| 7 | Actuator current minimum torque (thrust) | 00006 | 0~65535 | 0~65535Nm(N) | Read Only | | |
| 8 | Actuator protection current | 00007 | 0~65535 | 0~50.00A | Read Only | | |
| 9 | Actuator current max | 00008 | 0~65535 | 0~50.00A | Read Only | | |
| 10 | Actuator current minimum | 00009 | 0~65535 | 0~50.00A | Read Only | | |
| 11 | Actuator operating voltage | 00010 | 0~10000 | 0~1000.0V | Read Only | | |
| 12 | Pressure 1 | 00011 | 0~65535 | | Read Only | | |
| 13 | Pressure 2 | 00012 | 0~65535 | | Read Only | | |
| 14 | Temperature 1 | 00013 | 0~65535 | | Read Only | | |
| 15 | Temperature 2 | 00014 | 0~65535 | | Read Only | | |

Note: 1. Support multi-register reading, 00003 register is 16-bit binary, each represents 1 state and 16 states.1 is the lowest position and 16 is the highest position

## BYTK MODBUS Communication Data Parameter Table

2. The state can be read either by 1 or 2 function coils or by 3 or 4 function registers.By reading commands on one register, the values of 00001~00010 registers can be obtained and the reading efficiency is high.
3. Functions 1 and 2 correspond to variables, while functions 3, 4 and 6 correspond to two-byte variables.

Communication parameters:
(1) Rate: 38400, 192009600, 4800, 2400, 1200, 600 optional
(2) Data bit: 8 bit stop bit: 1 bit invalid
(3) Station number setting interval: 1-127
(4) Communication protocol: MODBUS RTU protocol (General Standard Protocol)

| Serial number | Function Code | Meaning |
|---|---|---|
| 1 | 01 Read coil status | Read the contents of the coil (single bits) from the actuator |
| 2 | 02 Read Discrete Input | Read the discrete input (multiple bits) from the actuator |
| 3 | 03 Read and hold register | Read the contents of the hold register (16 bits) from the actuato |
| 4 | 04 Read Input Register | Read the contents of the Input register (16-bit word) from the actuator |
| 5 | 05 Strong single coil | The coil (single bit) that writes the data to the actuator is "through" ("1") or "broken" ("0") |
| 6 | 06 Preset Single Register | Write data to a single holding register of the actuator (16 bits) |

## Precautions for wiring analog quantities on site

1. Pay attention to the difference between control signal and feedback signal when wiring;
2. Pay attention to polarity of control signal and feedback signal when wiring;
3.Feedback signal is active signal, external DC power supply can not be connected, otherwise equipment will be burned.

## Related knowledge

1.Position adjustment of angle feedback potentiometer: when the positioner is assembled, the angle feedback potentiometer should be ensured to match with the actual opening of the actuator. Method 1: adjust the actuator to the middle position, cut off the power and measure the resistance value of the middle point and the two ends of the potentiometer respectively. If the difference is too large, please adjust the middle point position of the potentiometer to make the resistance at both ends approximately the same. Method

2. adjust the actuator to the half open position, connect the positioner module and adjust the potentiometer gear to make the angle display about 50%.2. About the application of microswitch: if the microswitch acts when the zero position is full, the electronic braking function will be invalid, which will affect the positioning accuracy and sometimes cause oscillation. Therefore, for the adjustable electric actuator, the microswitch should only play the role of electrical protection, and should not touch the microswitch within the working stroke of zero position and full position. Therefore, users should avoid the action point of microswitch when calibrating the full zero position of valve.

3. PLC or DCS system in the application of electric actuator need to pay attention to the problem: PLC or DCS system output module of the relay is a small power relay, its contact can not withstand the voltage of 220 V and more than 1A current, so when using it to control the ordinary switch type actuator, we should transfer a power relay at the control end, or use our company's weak current signal to control the switch on Close the actuator.

4. Easy problems of 24V actuator in use: The 24V actuator is characterized by operating at safe voltage and good safety, but its working current is higher than 220V orThe 380V actuator has been increased a lot. If thecross-section area of the field power line is not enough, the voltage drop of the line may be too large to make the actuator work properly and the built-in control module can not work properly. Therefore, when laying the power line with 24V actuator, the starting current of the motor must be used for theoretical calculation.

5. Application characteristics of field bus actuator: 4 lines are required for each equipment of common adjustable electric actuator, 2 lines transmit control signals, 2 lines transmit feedback signals, and 40 lines are required for 10 equipment.Fieldbus only needs 2 lines to carry out more than one fieldbus-type actuator. This bus can not only transmit control signals but also return status information, setting information and fault information of each equipment. Since several A/D and D/A conversion links are omitted and control accuracy is improved, fieldbus-type electric actuator is the future development direction.6. Regarding self-holding function of remote control signal: In some cases, the signal of switch valve given by PLC or DCS system is pulse signal, which requires electric actuator to have self-holding function of switch signal.The user can achieve this function through setting.For example, a PLC or DCS sends a close signal, which does not hold the valve closed completely, but releases for a short time. When the electric actuator receives the short close signal, it starts the valve closing action until the valve is fully closed, instead of stopping the valve closing because the remote close signal disappears during the closing process.