HURKO®

HK Ⅱ Range Multi-Turn Intelligent Actuator

Operation Manual

HURKO SCIENCE & TECHNOLOGY CO.,LTD

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1．Overview

HK　series intelligent controller using MCU to control, can receive the switch quantity signal, proportion signal, bus signal, adaptor three-phase contactor or solid state relay control motor positive and reverse, realize the switch operation for the actuator. In the controller internal, integrated perfect protection circuit for overheating, lack of phase, over torque and so on. The controller can provide position signal feedback, multiple field programmable relay state feedback. According to the control signal can be divided into switch type and proportion type, according to the power supply can be divided into single-phase and three-phase.

Switch type receive only external switch quantity signal, the MCU control panel processing, output instruction after enlargement drive actuator motor remote opening or closing the action.

On the basis of switch type, the proportion type can receive external proportion signal.

Bus type: profibus-dp, Modbus, FF, Hart, Device Net

2．The main technical characteristics

2.1. The input voltage range: three phase: AC350V ~ 410 V 50/60 hz (special voltage should be customized)

single phase: AC200V ~ 240 V 50/60 hz (special voltage should be customized)

2.2. Using the absolute encoder, the valve position never lost.The absolute encoder can ensure the high precision, zero wear, long life, strong anti-interference, no battery support.

2.3. Optional all electronic torque detection technology to realize the torque continuous measurement, the over torque value can be adjusted without secondary calibration, it is unnecessary to consider mechanical wear.

2.4. Perfect bus supporting plan: Profibus-dp, Modbus, FF, Hart, Device Net five kind of bus available.

2.5. Unique double speed control mechanism, can make the actuators in work process avoid causing fluid surge effect.

2.6. Infrared setting device and knob (magnetic isolation technique) all can set working parameters, convenient and practical, truly realize free open cover.

2.7. Perfect level 3 password protection, but to different customers or operator separate authorization, prevent fault parameters set to actuator fault phenomenon.

2.8. Provide five field programmable non-hold type relay feedback, provide an alarm non-hold type relay feedback, extensible four hold-type relay feedback.

2.9.Input /output signal channel have been photoelectric isolation (can bear 2000 v surge voltage).

2.10. The position signal feedback 4 ~ 20 mA, load resistance: 50 Ω ~ 750 Ω, precision: 0.5%;

2.11. Operating temperature range: -30℃ ～+ 70 ℃.

2.12. Use humidity range or less 90% RH, non-condensing around, do not contain strong corrosive, flammable and explosive gas or dust.

3. Operating mode

3.1 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.

3.1.1 Inching operation (if inching mode is selected, see 4.4.2.8)

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.

3.1.2 Maintain operating (if Maintain operating mode is selected, see 4.4.2.8)

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).

Note: Inching or keep operation by the menu Settings

3.2 The stop

When the mode selection knob on \"stop\" position, the actuator will ban all electric operation.

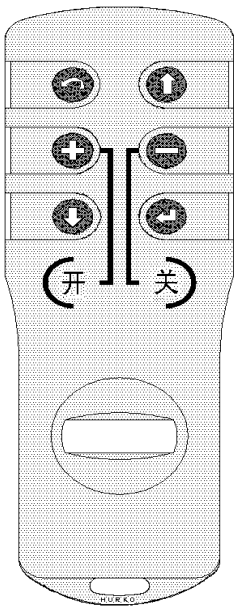
3.3 Remote control operation

3.3.1 This remote switch quantity control

Access to remote switch quantity control mode condition: 1, way in \" remote \" position knob; 2, No voltage on the manual/automatic wiring terminal .

3.3.2 Remote automatic control

Access to remote analog control mode condition: 1, way in \"distance\" position knob; 2, A voltage on manual/automatic wiring terminal .



4. The implementation of the working parameter Settings

4.1 Key definition

4.1.1 The key meaning on the hand-held setting tool:

key 1 = stop /return up; key2 = up. 3 key = add /open;

key 4 = minus /close; key 5 =down ; key 6 = confirm,

4.1.2 The key meaning of the mode knob:

Confirm: The mode knob move from the "**Stop**" position to "**Local**" position, hereinafter referred to as the press the confirm key;

Return: The mode key move from the "**Stop**" position to "**Remote**" position, hereinafter

referred to as the press the return key.

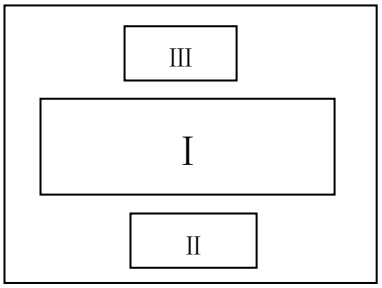
4.1.3 The key meaning of the operation knob

Move down: the operation knob move to "**Close**" position, hereinafter referred to as the press the down key;

Add: the operation move to "**Open**" position, hereinafter referred to as the \"press the add move key.

4.2. Liquid crystal display (LCD)

The actuator with a bitmap line LCD display. Its layout region Ⅰ, area Ⅱ and area Ⅲ.



The area Ⅰ for valve position display to valve position opening in the form of percentage of real-time display the current valve position value; The area Ⅱ for control mode display; The area Ⅲ for running status and alarm information display (see the "6. The alarm information" in the subsequent).

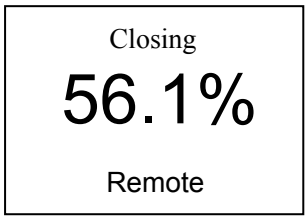
In the working parameters set menu, liquid crystal display (LCD) will be unified use area Ⅰ, area Ⅱ and area Ⅲ.

4.3 Power on or reset

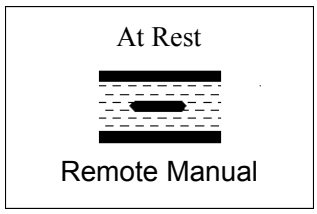
4.3.1 System self on power

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

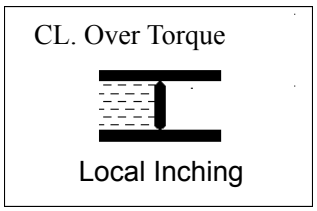
After actuator electrical initialized, the entire LCD screen with large font displays the percentage of valve opening. In the limit position, based on the simulation butterfly valve graphics mode display (see chart).



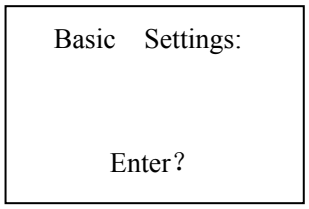
Displaying valve position



Displaying limit opened



Displaying limit closed



Displaying parameter set

4.4 Customizing the Actuator

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

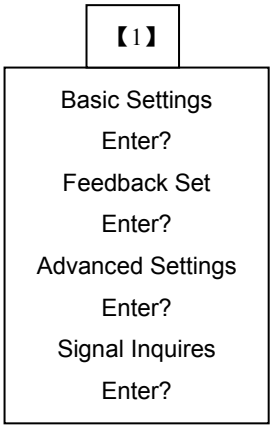
The value showed firstly is the last time setting on the LCD. Users can take advantage of this feature to view the previous setting.

The LCD will return the last menu if pressing Return key in the menu.

4.4.1 Entering the Menu

The LCD can display the parameter setting menu if the red knob is made go to “LOCAL” position and press a key in any of the 1 to 4 of keys 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 for 3 seconds long.

The LCD display firstly the NO.1 menu. There are four items in the menu, namely **Basic Settings, Feedback Set, Advanced Settings and Signal Inquires.**

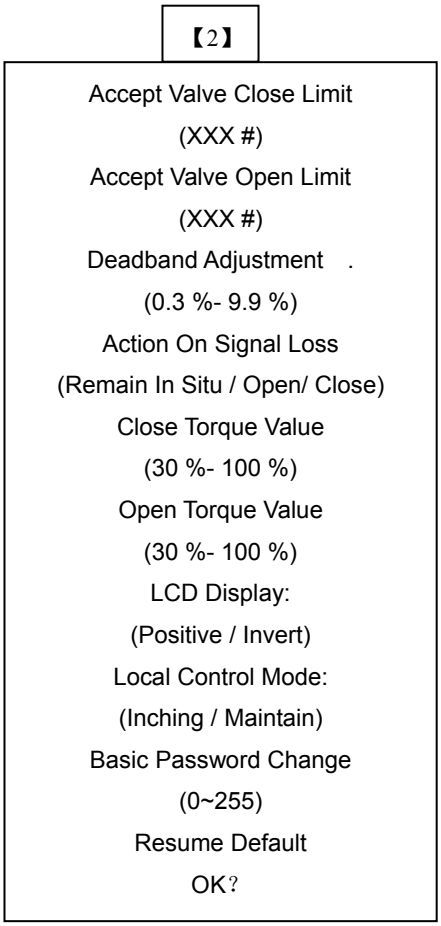


Use the **UP** and **Down** keys to select an items, use the **Confirm** key to may enter the next level menu, and use the **Return** key to return to the previous screen. If the basic password value is 0, the LCD display directly to the next menu level, otherwise enter the basic password to display the next level menu.

The Basic Settings, Feedback Set Advanced Settings can be independently set a password, the password setting 1-255 (be set in the subsequent menus).

4.4.2 Basic Settings

To select the "**Basic Settings** " items and press "**Confirm**" key, then into NO.2 menu. The NO.2 menu has 10 sub-items, namely **Accept Valve Close Limit, Accept Valve Open Limit, Deadband Adjustment, Action On Signal Loss, Close Torque Value, Open Torque Value, LCD Display, Local Control Mode, Basic Password Change, Resume Default.**



Use the **UP** and **Down** keys to select an items, and use the **Return** key to return to the previous menu.

4.4.2.1 Accept Valve Close Limit

In this items，the LCD will display the absolute encoder output encoding value（0#～65535#）. You can turn the handwheel of the actuator to make the valve move to the limit closed；Or place the red knob to “LOCAL” position，to make the valve move to the limit closed by electromotion. Pressing **Confirm** key to accept the limit closed，and the red lamp wil twinkle two times. If you press the **Confirm** key before press the **Return** key, the limit closed position is not set, and return to the previous menu.

4.4.2.2 Accept Valve open Limit

In this items，the LCD will display the absolute encoder output encoding value（0#～65535#）. You can turn the handwheel of the actuator to make the valve move to the limit opened；Or place the red knob to “LOCAL” position，to make the valve move to the limit opened by electromotion. Pressing **Confirm** key to accept the limit opened，and the red lamp wil twinkle two times. If you press the **Confirm** key before press the **Return** key, the limit opened position is not set, and return to the previous menu.

Note 1: the encoder values 0 and 65535 respectively smallest encoding value and the maximum encoding value as the absolute encoder, both are coincident. Setting process of open, closed limit full stroke after this coincidence point, but should ensure that the trip does not exceed the range of absolute encoders represent.

Note 2: If you need to set the other limit after setting one limit, you should not quit the original set items, and run the actuator to the other limit , and then into the other limit set items to confirm, otherwise there will be a "stall "alarm error.

4.4.2.3 Deadband Adjustment

The significance of the dead: This function is effective in remote automatic control mode. In this control mode, valve position value desired by the user is calculated according to the control current , and then compare that value with the current valve position value, if the absolute value of the difference is greater than the deadband value, actuators began action, so that the current valve position close to the target valve position. If the valve position of the absolute value of the difference between the current valve position and the user desires within the deadband range, the actuator stop action. Set the appropriate deadband is possible to prevent oscillation in the vicinity of a given position of valve .

In the items，the LCD displayed first on the last time settings（percentage of the valve's journey）.The value can be changed in“0.3%～9.9%”bound by **Add** key or **Minus** key， using **Confirm** key to accept.

4.4.2.4 Action On Signal Loss

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

If lost signal occurred, the actuator should be configured to one of the follows: “Remain In Situ”（no action）or“Close”or“Open”.

Using **Add** key or **Minus** key to select an items, using **Confirm** key to accept.

4.4.2.5 Close Torque Value

In the items，the LCD displayed first on the last time settings（percentage of the rating torque）.The value can be changed in“**30%～100%**”bound by **Add** key or **Minus** key， using **Confirm** key to accept.

4.4.2.6 Open Torque Value

In the items，the LCD displayed first on the last time settings（percentage of the rating torque）.The value can be changed in“**30%～100%**”bound by **Add** key or **Minus** key， using **Confirm** key to accept.

4.4.2.7 LCD Display

In the items，the LCD displayed first on the last time settings（**Positive** or **Invert**）. Using **Add** key or **Minus** key to select an items, using **Confirm** key to accept.

4.4.2.8 Local Control Mode

In the items，the LCD displayed first on the last time settings（**Inching** or **Maintain**）. Using **Add** key or **Minus** key to select an items, using **Confirm** key to accept.

4.4.2.9 Basic Password Change

In the items，the LCD displayed first on the last time settings. The value can be changed within the range of from **0** to **255** by **Add** key or **Minus** key， using **Confirm** key to accept.

4.4.2.10 Resume Default

If the parameters were set to confusion during the menu settings, you can use this items to recover **factory settings** except for "**Limit opened**" and "**Limit closed**" and "**Close direction**" parameters.

4.4.3. Feedback Set

In the NO.1 menu, you can select "**Feedback Set**" items and press "**Confirm**" key, then into NO.3 menu If the feedback password is set to 0 (that is, no password). If the password is not 0, you need to enter a feedback password and enter NO.3 menu.

The NO.3 menu has 5 sub-items, namely **Adjust 4mA For CPF, Adjust 20mA For CPF, Status Contact Output, Extended Contact Output and Feedback Password Change**.

Use the **UP** and **Down** keys to select an items, and use the **Return** key to return to the previous menu.

4.4.3.1 Adjust 4mA For CPF.

【3】

Adjust 4mA For CPF:
(3.XXmA~4.XXmA)
Adjust 20mA For CPF:
(19.XXmA~21.XXmA)
Status Contact Output:
(Output1~ Output 6)
Extended Contact Output:
(Output7~ Output 10)
Feedback Password Change
(0~255)

This items means that for the 4mA current signal sent by the actuator to be calibrated.

You select "**ADJUST 4mA FOR CPF**." items，the actuator force output the 4mA current signal for user's checking. The value of the 4mA can be changed by **Add** key or **Minus** key，using **Confirm** key to accept.

4.4.3.2 Adjust 20mA For CPF

This items means that for the 20mA current signal sent by the actuator to be calibrated.

You select "**ADJUST 20mA FOR CPF**." items，the actuator force output the 20mA current signal for user's checking. The value of the 4mA can be changed by **Add** key or **Minus** key，using **Confirm** key to accept.

4.4.3.3 Status Contact Output

Output1 ~ Output5 is a group of non-hold type relay (The switching status may change after power off) is used to indicate the state of the valve.

【4】

Relay OutputX Trigger by:
(Fully Closed / Fully Open / Over Torque Close / Over Torque Open / Over Torque / Closing / Opening / Running / Middle Position / Remote Mode / Local Mode)
Result: (Closure / Open)

It can be selected in the one of following status items that the relay is closed or disconnected. These States are**: Fully Closed / Fully Open / Over Torque Close / Over Torque Open / Over Torque / Closing / Opening / Running / Middle Position / Remote Mode / Local Mode**

Use "**Add** " key or "**Minus**" key to select "**Output1~ Output6** " and press "**Confirm**" key the screen displays the contents of NO.4 menu.

In the NO.4 menu, by **"Up "** or **" Down "** key you can select the items you want**,** and use "**Add**" and "**Minus**" keys to select the relay contact is closing (namely **Closure**)or disconnected(namely **Open**), after requirements are met to use "**Confirm**" key saves the selected contents.

【5】

Relay OutputX Middle Position
≥ XX %
Result: (Closure / Open)

If you choose the "**Middle Position**" items, and the screen display contents of NO.5 menu after you press the "**Confirm**" key.

The user needs to set a specific intermediate position which the valve is going to run, and also needs to set the contact are closed or disconnected. Using **"Up "** or **" Down "** key to select the items**,** and using "**Add**" and

"**Minus**" keys to select a specific intermediate position or the relay contact is closing or disconnected, after requirements are met to use "**Confirm**" key saves the selected contents.

In the NO.4 menu, if **Output6** items is selected, and press the Enter key, the screen display NO.17 menu. This items is used to set the alarm content of the **Output6** relay contained.

【17】

Alarm Contains Over Torque:
(No / Yes)
Alarm Contains Not At Remote:
(No / Yes)

The NO.17 menu has 2 sub-items, namely **Alarm Contains Over Torque** and **Alarm Contains Not At Remote.**

The **Alarm Contains Over Torque** means when the actual torque exceeds the set torque value, whether the Output6 relay alarm.

The **Alarm Contains Not at Remote** means when the actual torque exceeds the set torque value, whether the **Output6** relay alarm.

By **"Up "** or **" Down "** key you can select the items**,** and use "**Add**" and "**Minus**" keys to select the **Output6** relay contact is **Yes** or **No**, after requirements are met to use "**Confirm**" key saves the selected contents.

4.4.3.4 Extended Contact Output

Output7 ~ Output10 is a group of hold-type relay (The switching status does not change after power off) is used to indicate the state of the valve. Its mode of operation and the contents are same with the **" 4.4.3.3 Status Contact Output".**

【6】

ESD Control:
(Disable / Enable)
Close Seating:
(Position / Torque)
The Valve Close Direction:
(Closewise / Anti-Closewise)
Polarity For ACC.:
4mA = (Fully Closed / Fully Open)
Display Torque:
(No / Yes)
Polarity For CPF.:
4mA = (Fully Closed / Fully Open)
Two-Wire Control:
(Disable / Open First / Close First)
Calibrate 4mA For ACC.: (XX.XXmA)
Calibrate 20mA For ACC.:
(XX.XXmA)
Brake Time:
(0~150mS)
Stop Moving Time Before Brake:
(100~250mS)
Two-Speed Timer Control:
(Disable / Enable)
Senior Password Change:
(0~255)
Basic Password Inquires: (0~255)
Feedback Password Inquires: (0~255)
Set The Default Value

4.4.3.5 Feedback Password Change

In the items，the LCD displayed first on the last time settings. The value can be changed within the range of from **0** to **255** by **Add** key or **Minus** key, using **Confirm** key to accept.

4.4.4 Advanced Settings

In the NO.1 menu, you can select " **Advanced Settings** " items and press "**Confirm**" key, then into NO.6 menu. You need to enter a senior password and enter NO.6 menu.

The NO.6 menu has 15 sub-items, namely **ESD Control, Close Seating, The Valve Close Direction, Polarity For ACC., Display Torque , Polarity For CPF., Two-Wire Control , Calibrate 4mA For ACC., Calibrate 20mA For ACC., Brake Time , Stop Moving Time Before Brake , Two-Speed Timer Control , Senior Password Change , Basic Password Inquires and Feedback Password Inquires.**

Use the **UP** and **Down** keys to select an items, and use the **Return** key to return to the previous menu.

4.4.4.1 ESD Control

In this items， the previous set value ("**Enable**" or "**Disable**") will be displayed in the bottom of the LCD.

By "**Add**" and "**Minus**" keys to select the desired value, using "**Confirm**" key to save the selected changes. When you select "**Enable**" and press "**Confirm**" key the screen appear contents of NO.14 menu.

The NO.14 menu has 6 sub-items, namely **ESD Motion Position，ESD Signal Effective Level，ESD Beyond On Thermal，ESD Beyond On The Stop，ESD Beyond On Two-Speed and ESD Beyond On Torque.**

Using the **UP** and **Down** keys to select an items, using "**Add**" and "**Minus**" keys to select the desired value, using "**Confirm**" key to save the selected changes. and using the **Return** key to return to the previous menu.

4.4.4.1.1 ESD Motion Position

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）.

In this items，the previous set value ("**Remain In Situ** " or "**Open**" or "**Close**") will be displayed in the bottom of the LCD.

4.4.4.1.2 ESD Signal Effective Level

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 this items，the previous set value ("**High** " or " **Low** ") will be displayed in the bottom of the LCD.

4.4.4.1.3 ESD Beyond On Thermal

This items mean is that if there is a motor overheating alarm is also the implementation of ESD control action?

In this items，the previous set value ("**Yes** " or " **No** ") will be displayed in the bottom of the LCD.

4.4.4.1.4 ESD Beyond On the Stop

This items mean is that if the button is in the "stop" position is also to perform ESD control?

In this items，the previous set value ("**Yes** " or " **No** ") will be displayed in the bottom of the LCD.

4.4.4.1.5 ESD Beyond On Two-Speed

This items mean is that when the actuator is in the " **Two-Speed** " mode if you want to perform ESD control?

In this items，the previous set value ("**Yes** " or " **No** ") will be displayed in the bottom of the LCD.

4.4.4.1.6 ESD Beyond On Torque

This items mean is that when the actuator is in exceeds the set torque if you want to perform ESD control?

In this items，the previous set value ("**Yes** " or " **No** ") will be displayed in the bottom of the LCD.

4.4.4.2 Close Seating

【14】

ESD Motion Position:
(Remain In Situ / Open/ Close)
ESD Signal Effective Level:
(High / Low)
ESD Beyond On Thermal:
(No / Yes)
ESD Beyond On The Stop:
(No / Yes)
ESD Beyond On Two-Speed:
(No / Yes)
ESD Beyond On Torque:
(No / Yes)

In this items，the LCD display firstly the last setting "**Position**" or "**Torque**". Using "**Add**" and "**Minus**" keys to select the desired value, using "**Confirm**" key to save the selected changes, and using the **Return** key to return to the previous menu.

4.4.4.3 The Valve Close Direction

In the items，the LCD display firstly the last setting "**Closewise** " or " **Anti-Closewise** ". Using "**Add**" and "**Minus**" keys to select the desired value, using "**Confirm**" key to save the selected changes, and using the **Return** key to return to the previous menu.

4.4.4.4 Polarity For ACC.

In remote automatic control mode, if the user issued 4mA current signals, this items is used to determine the position of the valve operation.

In the items，the LCD display firstly the last setting "**4mA = Fully Closed**" or "**4mA =Fully Open**". Using "**Add**" and "**Minus**" keys to select the desired value, using "**Confirm**" key to save the selected changes, and using the **Return** key to return to the previous menu.

4.4.4.5 Display Torque

In the items，the LCD display firstly the last setting "**Yes**" or "**No**". Using "**Add**" and "**Minus**" keys to select the desired value, using "**Confirm**" key to save the selected changes, and using the **Return** key to return to the previous menu.

4.4.4.6 Polarity for CPF.

If the actuator emitted 4mA current signal, this items is used to determine the corresponding position of the valve.

In the items，the LCD display firstly the last setting "**4mA = Fully Closed**" or "**4mA =Fully Open**". Using "**Add**" and "**Minus**" keys to select the desired value, using "**Confirm**" key to save the selected changes, and using the **Return** key to return to the previous menu.

4.4.4.7 Two-Wire Control (External connections is shown in Fig.6-7～Fig.6-10)

In the items，the LCD display firstly the last setting " **Disable** " or " **Open First** " or " **Close First** ". Using "**Add**" and "**Minus**" keys to select the desired value, using "**Confirm**" key to save the selected changes, and using the **Return** key to return to the previous menu.

The " **Disable** " means that this function is not available.

The " **Open First** " means that actuator to open action when there is voltage signal on the connections of control room and actuator. Otherwise the actuator to close operation.

The " **Close First** " means that actuator to close action when there is voltage signal on the connections of control room and actuator. Otherwise the actuator to open operation.

4.4.4.8 Calibrate 4mA For ACC.

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

In this items, user need to sent 4 mA current to the actuator, and the LCD will display the value (mA) of the ACC to be collect by the actuator. To wait until after the current stable press "**Confirm**" key to save the current value of the acquisition.

4.4.4.9 Calibrate 20mA For ACC.

In this items, user need to sent 20 mA current to the actuator, and the LCD will display the value (mA) of the ACC to be collect by the actuator. To wait until after the current stable press "**Confirm**" key to save the current value of the acquisition.

4.4.4.10 Brake Time

This function is used to give an reverse energy to the motor and make the motor stop quickly so that we can obtain an accurate valve position control. The motor reverse-rotation time can be adjusted within 0～150mS.

The three-phase motor for 2 ~ 50mS, single-phase motors 5 ~ 150mS.

Using "**Add**" and "**Minus**" keys to select the desired value, using "**Confirm**" key to save the selected changes, and using the **Return** key to return to the previous menu.

4.4.4.11 Stop Moving Time Before Brake

The items means that actuator must be suspended for some time before brake. The three-phase motor for 150~ 250mS, single-phase motors 0~ 150mS.

Using "**Add**" and "**Minus**" keys to select the desired value, using "**Confirm**" key to save the selected changes, and using the **Return** key to return to the previous menu.

4.4.4.12 Two-Speed Timer Control

The **Two-Speed Timer Control** Refers to the actuators of the running process is not continuous, but stop and go. The two-speed timer extends the operating time of the actuator in the closing or the opening direction, by pulsating the motor up or off. The Pulsation may be applied to full valve travel or only a part of it. The pulsating length and motor off times are adjustable.

In the NO.6 menu, if you select " **Two-Speed Timer Control** " items, the " **Disable**" or " **Enable**" appear in the bottom of the screen. If you select " **Enable**" items and press "**Confirm**" key, then into NO.11 menu. The NO.11 menu has 8 sub-items, namely **Open Direction Start, Open Direction End Position, Open Direction Pulsate Journey, Open Direction Stoppage Time, Close Direction Start Position, Close Direction End Position, Close Direction Pulsate Journey and Close Direction Stoppage Time.**

Using the **UP** and **Down** keys to select an items, using "**Add**" and "**Minus**" keys to select the desired value, using "**Confirm**" key to save the selected changes. and using the **Return** key to return to the previous menu.

4.4.4.12.1 Open Direction Start Position

The items means in this mode, the start position in the actuator opening direction. This value can be changed within the range of from 0% to 100% .

【11】

Open Direction Start Position:
(0～100%)
Open Direction End Position:
(1～100%)
Open Direction Pulsate Journey:
(2～100%)
Open Direction Stoppage Time:
(1～255S)
Close Direction Start Position:
(0～100%)
Close Direction End Position:
(0～100%)
Close Direction Pulsate Journey:
(2～100%)
Close Direction Stoppage Time:
(1～255S)

4.4.4.12.2 Open Direction End Position

The items means in this mode, the end position in the actuator opening direction. This value can be changed within the range of from 1% to 100%. **(Note: The end position must be greater than the start position.)**

4.4.4.12.3 Open Direction Pulsate Journey

This items sets the required pulsating length which the actuator run in opening direction. This value can be changed within the range of from 2% to 100%.

4.4.4.12.4 Open Direction Stoppage Time

This items sets the required pulsation off time in opening direction. This value can be changed within the range of from 1s to 100s.

4.4.4.12.5 Close Direction Start Position

The items means in this mode, the start position in the actuator closing direction. This value can be changed within the range of from 0% to 100%.

4.4.4.12.6 Close Direction End Position

The items means in this mode, the end position in the actuator closing direction. This value can be changed within the range of from 1% to 100%. **(Note: The end position must be less than the start position.)**

4.4.4.12.7 Close Direction Pulsate Journey

This items sets the required pulsating length which the actuator run in closing direction. This value can be changed within the range of from 2% to 100%.

4.4.4.12.8 Close Direction Stoppage Time

This items sets the required pulsation off time in closing direction. This value can be changed within the range of from 1s to 100s.

4.4.4.13 Senior Password Change

In the items，the LCD displayed first on the last settings. The value can be changed within the range of from **0** to **255** by **Add** key or **Minus** key, using **Confirm** key to accept.

4.4.4.14 Basic Password Inquires

In the items，the LCD displayed first on the last setting basic password .

4.4.4.15 Feedback Password Inquires

In the items, the LCD displayed first on the last setting feedback password.

4.4.5 Signal Inquires

In the NO.1 menu, you can select " **Signal Inquires** " items and press "**Confirm**" key, then into NO.9 menu.

The NO.9 menu has 8 sub-items, namely **Position Of The Selector Knob, Position Of The Operator Knob, Remote Open Signal Appear, Remote Close Signal Appear, Remote keep Signal Appear, Remote Auto Signal Appear, Remote ESD Signal Appear and Position Control Current.**

Using the **UP** and **Down** keys to select an items and using the **Return** key to return to the previous menu.

【10】

Position Of The Selector Knob:
(Stop / Local / Remote)
Position Of The Operator Knob:
(None / Open / Close)
Remote Open Signal Appear?
(No / Yes)
Remote Close Signal Appear?
(No / Yes)
Remote keep Signal Appear?
(No / Yes)
Remote Auto Signal Appear?
(No / Yes)
Remote ESD Signal Appear?
(No / Yes)
Position Control Current:
(XX.XXmA)

4.4.5.1 Position Of The Selector Knob

In the items, 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. **Note: In this items, the implementation of the "Return" does not work by red knob.**

4.4.5.2 Position Of The Operator Knob

In the items, 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 "**None**" position, the LCD display "**None**", otherwise making a mistake.

4.4.5.3 Remote Open Signal Appear

In the items, the LCD will display "**Yes**" (if the signal is existent) or "**No**" (if the signal is nonexistent).

4.4.5.4 Remote Close Signal Appear

In the items, the LCD will display "**Yes**" (if the signal is existent) or "**No**" (if the signal is nonexistent).

4.4.5.5 Remote keep Signal Appear

In the items, the LCD will display "**Yes**" (if the signal is existent) or "**No**" (if the signal is nonexistent).

4.4.5.6 Remote Auto Signal Appear

In the items, the LCD will display "**Yes**" (if the signal is existent) or "**No**" (if the signal is nonexistent).

4.4.5.7 Remote ESD Signal Appear

In the items, the LCD will display "**Yes**" (if the signal is existent) or "**No**" (if the signal is nonexistent).

4.4.5.8 Position Control Current

In the items, the LCD will display the value (mA) of the ACC to be collect by the actuator.

4.5 The Default Settings

Deadband: 1.5%	**ESD Control: Disable**
Action On Signal Loss: Remain In Situ	**Close Seating: Position**
Close Torque Value: 70%	**The Valve Close Direction: Closewise**
Open Torque Value: 70%	**Polarity For CPF.: 4mA= Fully Closed**
Local Control Mode: Inching	**Polarity for ACC.: 4mA = Fully Closed**
Outpt1 Contact: Fully Closed: Closure	**Two-Wire Control: Disable**
Outpt2 Contact: Fully Open: Closure	**Brake Time: 0 mS**
Outpt3 Contact: Over Torque Close: Closure	**Stop Moving Time Before Brake: 150 mS**
Outpt4 Contact: Over Torque Open: Closure	**Two-Speed Timer Control: Disable**
Outpt5 Contact: Red knob at remote: Closure	**The Passwords: 0**
Outpt6 Contact: Failure Alarm	**Display Torque: No**

5. LCD Information

5.1 Alarm Information

5.1.1 CPU Error

When the "**CPU Error**" is displayed in the alarm area, it means a mistake occurs in the CPU in the actuator.

5.1.2 ROM Error

When the "**ROM Error**" is displayed in the alarm area, it means a mistake occurs in the program area in the actuator.

5.1.3 RAM Error

When the "**RAM Error**" is displayed in the alarm area, it means a mistake occurs in the data area in the actuator.

5.1.4 AD Error

When the "**AD Error**" is displayed in the alarm area, it means an analog to digital conversion function error occurs in the actuator.

Note: The four kinds of troubles can be eliminated by powering up over again after powering down. If this method is of no effect，you must replace the main control board.

5.1.5 CL. Over torque

When the "**CL. Over torque**" is displayed in the alarm area, it means that the torque of the actuator withstanding is bigger than the setting torque in the valve closing, and the running of motor is halted and the restriction running in this direction is established. The restriction will be eliminated if the actuator run a bit of distance in valve open or close torque to be set again. And the alarm contact may be triggered (Depending on whether set in the alarm contacts).

5.1.6 OP. Over torque

When the "**OP. Over torque**" is displayed in the alarm area, it means that the torque of the actuator withstanding is bigger than the setting torque in the valve closing, and the running of motor is halted and the restriction running in this direction is established. The restriction will be eliminated if the actuator run a bit of distance in valve open or close torque to be set again. And the alarm contact may be triggered (Depending on whether set in the alarm contacts).

5.1.7 Lost Phase

When the "**Lost Phase**" is displayed in the alarm area, it means that t one of 3 phase for power supply is lost, then the running of motor is halted. And the alarm contact is triggered.

5.1.8 Lost Analog

When the "**Lost Analog**" is displayed in the alarm area, it means that the 4mA～20mA analog control current signal is not present, then the running of motor is halted. And the alarm contact is triggered.

5.1.9 OP.& CL.SIG.ON

When the "**OP.& CL.SIG.ON**" is displayed in the alarm area, it means that the remote close signal and remote open signal are presence at one time, then the running of motor is halted. And the alarm contact is triggered.

5.1.10 Turn DIR. Error

When the "**Turn DIR. Error**" is displayed in the alarm area, it means that the direction of rotation of the valve is not correct. Then the running of motor is halted. And the alarm contact is triggered.

5.1.11 POS. Error

When the "**POS. Error**" is displayed in the alarm area, it means that the valve's position change is not correct. Then the running of motor is halted. And the alarm contact is triggered.

5.1.12 MOT. Over Thermal

When the "**MOT. Over Thermal**" is displayed in the alarm area, it means that the motor temperature is too high. Then the running of motor is halted. And the alarm contact is triggered.

5.1.13 Motor Overload

When the "**Motor Overload**" is displayed in the alarm area, it means that the motor stall. Then the running of motor is halted. And the alarm contact is triggered.

5.1.14 Over POS. Limit

When the "**Over POS. Limit**" is displayed in the alarm area, it means that the range of the code of the absolute encoder indicated valve's journey has gone beyond.

5.1.15 ESD Opening

When the "**ESD Opening**" is displayed in the alarm area, it means that the effectual voltage signal is presence at the ESD control terminal and actuator is carrying out open valve act. And the alarm contact is triggered.

5.1.16 ESD Closing

When the "**ESD Closing**" is displayed in the alarm area, it means that the effectual voltage signal is presence at the ESD control terminal and actuator is carrying out close valve act. And the alarm contact is triggered.

5.1.17 ESD Active

When the "**ESD Active**" is displayed in the alarm area, it means that the effectual voltage signal is presence still at the ESD control terminal， then all the electromotion operation to the actuator is of no effect. And the alarm contact is triggered.

5.2 Status display information

5.2.1 Opening

When the "**Opening**" is displayed in the screen, it means that actuator being executed to open the valve.

5.2.2 Closing

When the "**Closing**" is displayed in the screen, it means that actuator being executed to close the valve.

5.2.3 At Rest

When the "**At Rest**" is displayed in the screen, it means that the actuator does not open or close the valve.

5.2.4 Pulsating Pause

When the "**Pulsating Pause**" is displayed in the screen, it means that the actuator is in a pulsating suspended state for the **Two-Speed Timer Control.**

5.2.5 Stop

When the "**Stop**" is displayed in the screen, it means that red knob of actuator is at **Stop** position.

5.2.6 Local Inching

When the "**Local Inching**" is displayed in the screen, it means that the actuator works in local inching.

5.2.7 Local Maintain

When the "**Local Maintain**" is displayed in the screen, it means that the actuator works in local maintain.

5.2.8 Remote Manual

When the "**Remote Manual**" is displayed in the screen, it means that the operating mode of the actuator is remote voltage control (on-off control) .

5.2.9 Remote Auto

When the "**Remote Auto**" is displayed in the screen, it means that the operating mode of the actuator is remote analog current control.

5.2.10 Remote Bus

When the "**Remote Bus**" is displayed in the screen, it means that the operating mode of the actuator is remote fieldbus control.

6. External connecting wiring diagram to control

6.1 Remote Manual Control

If user makes use of the DC 24V of the actuator output，the centre control room connect wiring with the actuator are fig. 6-1、fig.6-2 and fig.6-3. The numbers in the circlet are the terminal name of the wiring box in the actuator(following similar).

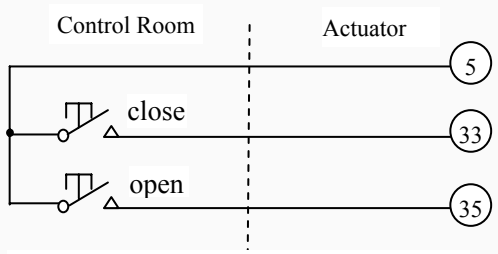


Fig.6-1 Inching control to open or close for DC24V from actuator

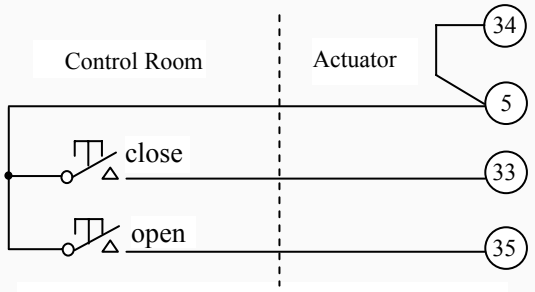


Fig.6-2 Maintaining control to open or close for DC24V from actuator

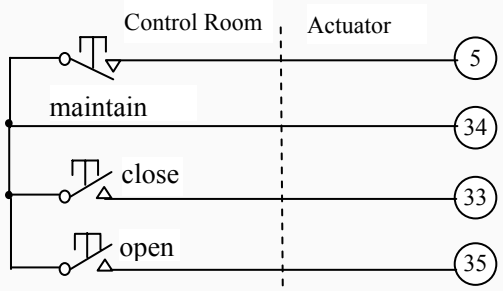


Fig.6-3 Maintaining or stop control to open or close for DC24V from actuator

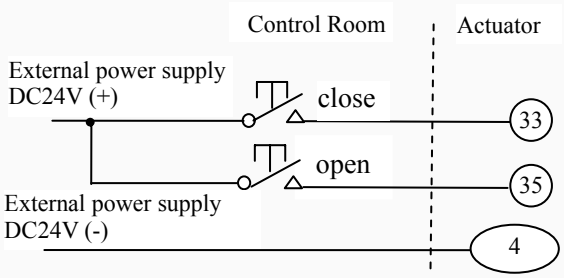


Fig.6-4 Inching control to open or close for external power supply

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. 6-4、fig.6-5、and fig. 6-6.

Notice：The terminal(-)of the DC 24V links the terminal 29 in the wiring box when the external DC 24V is used.

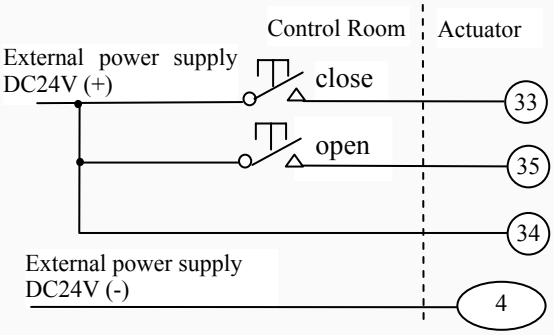


Fig.6-5 Maintaining or stop control to open or close for external power supply

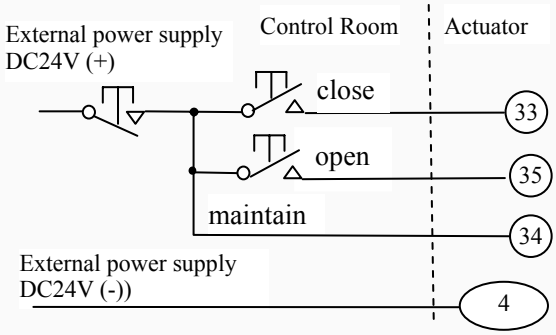


Fig.6-6 Maintaining or stop control to open or close for external power supply

The two-wire control wiring as shown in fig. 6-7 and fig.6-8(the control power supply from the actuator),fig.6-9 and fig.6-10(the control power supply from the exterior).

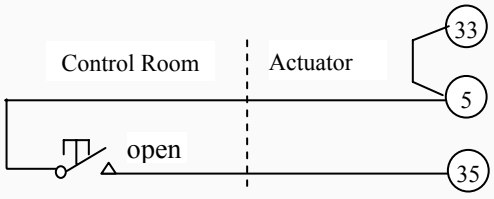


Fig.6-7 Two-wire control to open

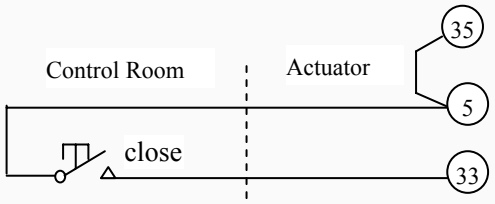


Fig.6-8 Two-wire control to close

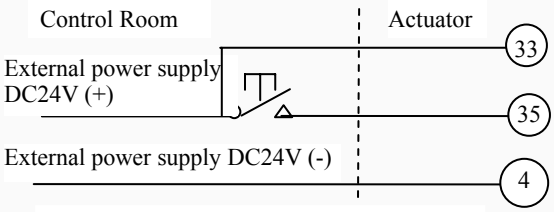


Fig.6-9 Two-wire control to open for external power supply

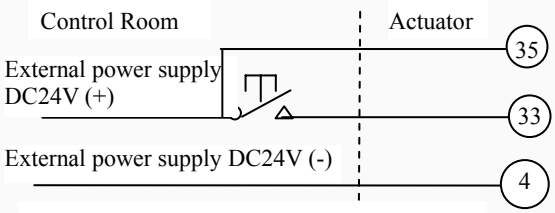


Fig.6-10 Two-wire control to close for external power supply

6.2 ESD Control

The ESD control wiring as shown in fig. 6-11 and fig.6-12(the control power supply from actuator),fig.6-13and fig.6-14(the control power supply from the exterior).

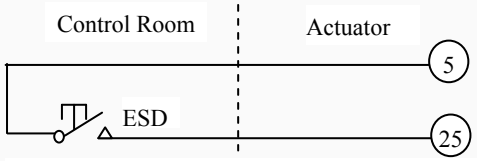


Fig.6-11 ESD control of nonzero voltage for DC24V from the actuator

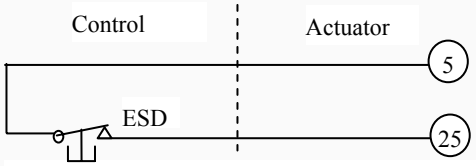


Fig.6-12 ESD control of zero voltage for DC24V from the actuator

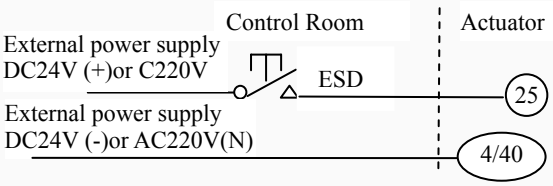


Fig.6-13 ESD control of nonzero voltage for external power supply

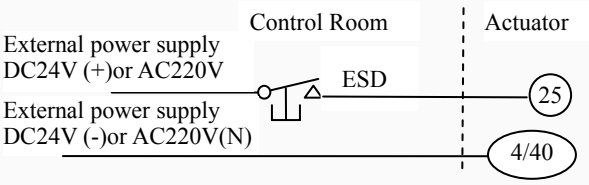


Fig.6-14 ESD control of zero voltage for external power supply

6.3 Remote Analog Current Control (Auto control)

The actuator can receive 4mA～20mA analog current signal for positioning control. This control wiring as shown in fig. 6-15(the control power supply from actuator),fig.6-16(the control power supply from the exterior).

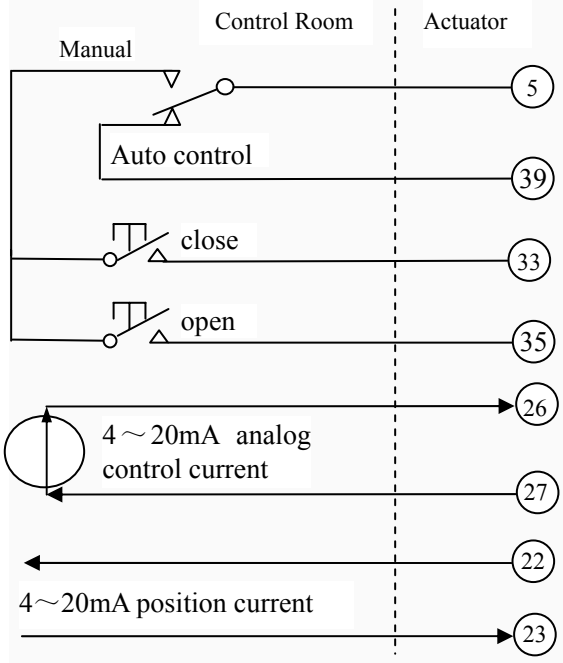


Fig.6-15 Remote autocontrol or manual control to switch each other for DC24V from the

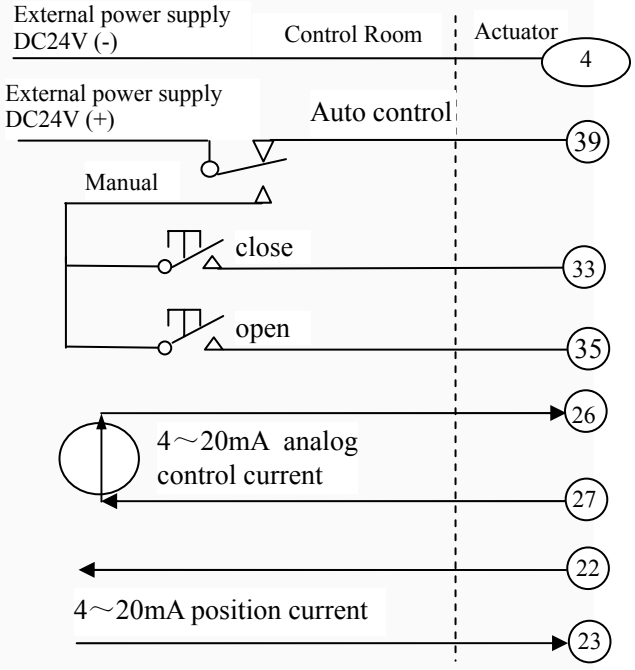


Fig.6-16 Remote autocontrol or manual control to switch each other for external power supply

6.4 Status Outputs

The **Status Outputs** control wiring as shown in fig. 6-17.

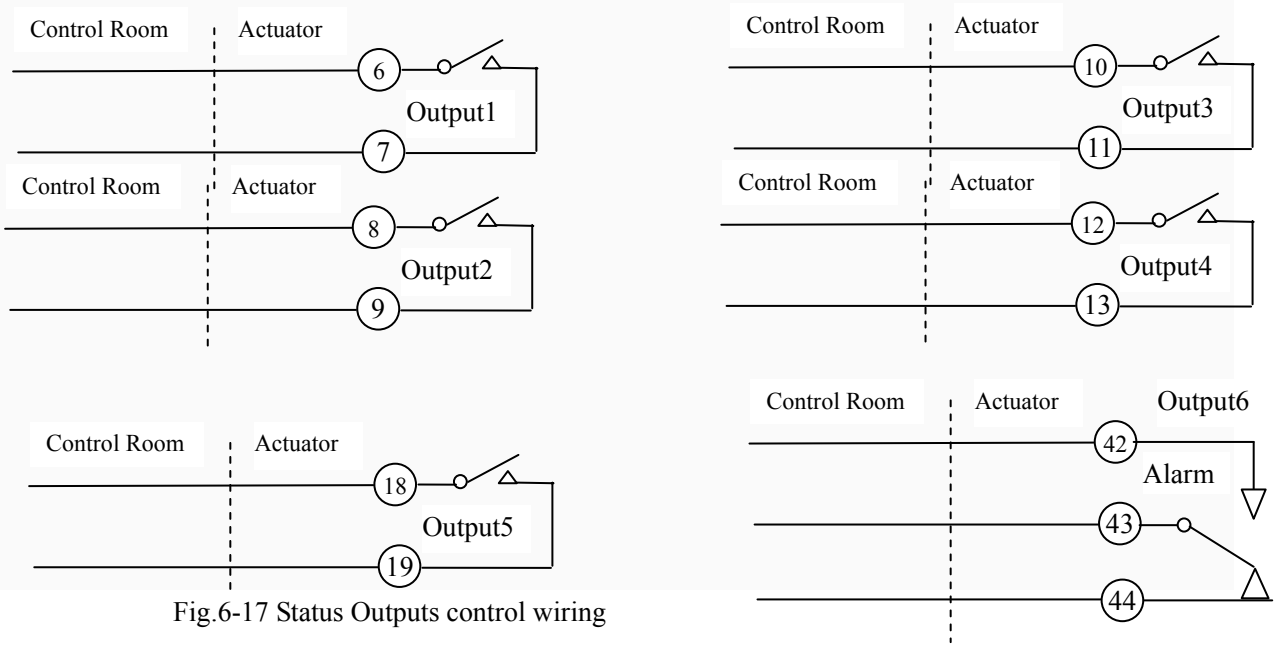


Fig.6-17 Status Outputs control wiring

7. Wiring box

The external connection wiring of the actuator are 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
1	U**	Power supply input 1	19	R-RELAY-2	Remote indication contact 2 for red knob
2	V**	Power supply input 2	22	CPT (+) *	Current position transmission（+）
3	W**	Power supply input 3	23	CPT (-)*	Current position transmission（-）
4	0Vdc	None steady DC 24V(-) output	25	ESD	ESD Control Input Terminal
5	24Vdc	None steady DC 24V(+) output	26	ACC (+) *	Analog control current input（+）
6	S1-RELAY-1	S1 status contact 1	27	ACC（-）*	Analog control current input（-）
7	S1-RELAY-2	S1 status contact 2	33	R- CLOSE	Remote close signal input terminal
8	S2-RELAY-1	S2 status contact 1	34	R-HOLD	Remote holding signal input terminal
9	S2-RELAY-2	S2 status contact 2	35	R- OPEN	Remote open signal input terminal
10	S3-RELAY-1	S3 status contact 1	39	R-AUTO	Remote AUTO signal input terminal
11	S3-RELAY-2	S3 status contact 2	40	R-H-COM	Remote high voltage signal COM
12	S4-RELAY-1	S4 status contact 1	42	MONI-NC	Alarm contact NC.(power down)
13	S4-RELAY-2	S4 status contact 2	43	MONI-COM	Alarm contact COM
18	R-RELAY-1	Remote indication contact 1 for red knob	44	MONI-NO	Alarm contact NO.(power down)

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

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

The terminals with "*" is additament，they are efficacious but user has called for it in the indent.

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