One、 Machining of the Drive Bush

1.1 Thrust Base Type :

1) Turn actuator onto its side, remove the two cap-headed screws holding base plate onto thrust base, pull out the drive bush complete with its bearing assembly. Remove the thrust bearing of the drive bush's double end (The two thrust bearing stop ring near the mid bulgy – shoulder of the drive bush may not be removed.) (Refer to diagram1-1 ,1-2).

2) According to the thread dimension of the valve stem, machine the internal screw thread of the drive bush.

3) Remove all swarf from the drive bush and others that removed, ensuring that they are in good condition, clean and greased. According to the above steps, with adverse steps we can refit the drive bush and base assembly on the actuator, ensuring that the slots in the drive bush are located into the drive dogs of the hollow output shaft. (The bearing modules must be topped up lubricating oil).

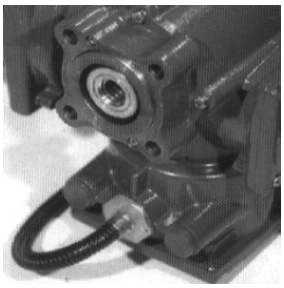


diagram 1-1

diagram 1-2

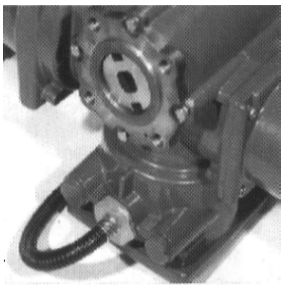


diagram 1-3

1.2 Non-Thrust Base Type (Refer to diagram 1-3).

1) Turn actuator onto its side, remove the base, the retaining clip on top of the drive bush can be seen now.

2) Turn the retaining clip slots until reach the drive dogs of the output shaft, or with the screwdriver seek out the retaining clip, we can remove the drive bush. According to the connection mode of the configured value, we can machine the hole of the drive bush shaft, key seat or combinative-dogs, and refit them assembly on the actuator. Then fit on the retaining clip and base. Before fitting on the base, must daub between base and drive bush with any lubricating – oil.

TWO、Installation of the actuator

2.1 Installation with the Visible stem valves:

2.2.1 Install the Thrust Base Type:

1. When leaving factory, according to the requests of the clients the screw

thread inside the drive bush has been machined well. As a combination of actuator and drive bush, it is assembled with valve.

Firstly let the hand – operating step available, then place the actuator onto valve, put the screw thread of the actuator and the valve stem in order, wind the handwheel in the opening direction to engage the drive bush onto the stem. Continue winding until the actuator is firmly down on the valve flange. Wind two further turns, fit securing bolts and tighten fully.

2. If the clients machine the internal screws of the drive bush, according to above 1.1, machine and fit in the drive bush. According to the above " a ", fit them assembly.

2.1.2 Installing the Non – thrust Base Type

Ensuring that the drive bushes of the non- thrust type have been machined, then fit the actuator and valve as a combined unit.

Firstly let the hand – operating step of the actuator available, then place the actuator onto the valve, let the valve stem into the hole of the drive bush, or the combinative – dog of the drive bush is secured to the combinative – dog of the valve, wind the handwheel in opening direction until the actuator is firmly down on the valve flange. Wind two further turns, fit securing bolts and tighten fully.

2.2 Installation with the valve with gear case

Firstly checking that the drive bush, input shaft, key and key seat are all appropriate or not, fit the base and drive bush assembly on the actuator firstly, then place the actuator onto the flange of the gear case correctly, let the input shaft of the gear case into the hole of the drive bush shaft, wind the handwheel, ensuring that the key is located into the key – seat of the drive bush, then fit securing bolts and tighten fully.

2.3 Installation with the hidden – stem valve

Popularly according to the 2.1.2, use the same way to assembly. But if the actuator will support thrust, we should use the thrust – type connection with thrust bearing.

2.4 Handwheel Sealing

Ensuring that sealing plug in center of handwheel is sealed with PTFE tape and fully tightened, ensuring that moisture does not pass down the output shaft of the actuator.

2.5 Connecting to Terminals and Cable Entry

1. According to the control orders, connect the power wires and signal wires.

2. The actuator has expert earth terminals, in order to ensure that persons and equipments are safe, the actuator should be earthed credibly.

3. Only appropriate certified Explosion – Proof entry reduces, glands or conduit

may be used in hazardous locations. Ensure that threaded adaptors, Seal unused cable entries with a steel or brass threaded plug. In hazardous areas an appropriately certified threaded blanking plug must be used.

2.6 Mounting the LCD Screen Correctly

When the actuator is located on the different orientations, in order to make the actuator have the natural direction of the LCD display, that is to say the charactors have natural display direction, the LCD screen of the actuator provides four sorts of settings:

1. Installing the actuator in the horizontal direction (operating handwheel is upturned), the LCD screen is mounted with a natural position.

2. The actuator is installed conversely (operating handwheel is gadarene), the charactors are displayed reversely.

3. Installing the actuator in the leftward direction (operating handwheel is leftward), the LCD screen is mounted near by the side of the flange.

4 Installing the actuator in the rightward direction (operating handwheel is rightward), the LCD screen is mounted near by the side of the flange. The charactors are displayed reversely.

THREE. Operating your Actuator

3.1 Operating by hand

The actuator provides operating handwheel and Electric/Handwheel lever, when the actuator is in the special instance, e.g. main power failed or the control circuit failed and so on, we can operate the actuator by hand. Before operating the handwheel, firstly let the mode selection switch be in the “ stop ”or “ local ” position. To engage handwheel drive depress the Electric/hand lever into “ Hand ” position and turn the handwheel slowly to engage the clutch. When the actuator has been in the “ Hand ”step, the lever can now be released and return to the free position by its clockwork spring. But the internal clutch has been latched up in the “ Hand ” position. Now wind the handwheel and the output shaft will be driven, thus is the hand operating.

The clutch is ably designed, it prefers electric operation to hand operation. When the motor turning the clutch will switch to the electric operating position automatically.

The switching lever may be latched up in the electric operating position or the hand operating position by the padlock. Please notice : if the lever is latched up in the hand operating position by the padlock, the turning of the motor can not let the clutch switch to the electric operating position automatically.

3.2 Local Operation

If you want to use local operation, you should let the mode selection switch (red switch)lie to the local position and control the actuator by the operation switch (black switch). There are two kinds of work mode for the local operation: push to run and maintained, these are set by the setting tool. Details as follows:

Push to run : when you let the operation switch (black switch) lie to the closing position, the actuator will act towards the closing direction. When you release the operation switch, the operation switch will return to the original position, the action towards the closing direction will be stopped. When you let the operation switch lie to the opening position, the actuator will act towards the opening direction. Releasing the operation switch, it will return to the original position and the actuator will stop running immediately.

Maintained: let the operation switch locate in the closing position and if you release the switch, it will return to the original position, but the actuator maintains acting towards the closing direction. As for opening operation, you let the operation switch locate in the opening position, even if you release it and let it return to the original position, the actuator will maintain acting towards the opening direction.

3.3 Remote Operation

Details see <Series HKC Actuator Selection and Maintenance Instructions>, <Series HKC Actuator Selection and Maintenance Instrucctions>.

ROUR. Debugging your Actuator

4.1 Intrinsically Safe Setting Tool.

The setting Tool allows parameters to be configured with non – invaded mode to suit the requirements, it allows parameters to be checked and failures to be diagnosed. If you want to use the setting Tool, you must let the Mode Switch locate in the “local” or “Stop” position aforehand. When a button is depressed the Setting Tool transmits the relevant instruction to the actuator by infra – red pulses and must therefore be directly in front of the actuator indicator window and at a distance no greater than 1.00m.

↓ : Downward Shift Button. It is used for selecting the next item of the current menu and it circulates round the current menu from one item to another. That is to say, when the current cursor points to the last item, depress this button again, the current cursor will return to the first item of the current menu.

+: Plus Button. Increase / Change display function’s value or option setting.

-: Minus Button. Decrease / Change displayed function’s value or option setting.

↵: Enter Button. Enter displayed value or option setting.

↖: Return Button.. Return from current menu to upper menu.

R: Reset Button. When the actuator enters into trap contingently, depress this button , the Setting Tool will transmit a hardware resetting signal to the actuator and the actuator will recover to the nomal program circles.

Notice: When you let the Mode Switch locate in the "local" position, depressing the "+"button and " ↓ " button synchronously the actuator will execute "Local Opening" action, depressing the "-" button and "↵" button synchronously the actuator will execute " Local Closing" action.

Setting Tool Model: HKC/HKM;

Explosion - Proof Mark: Exia ⅡcT4;

Explosion - Proof Certificate Number:

Working Condition: Temperature: -30℃~+50℃, Opposite Humidity: ≤95%, Atmosphere pressure :0.86 MPa ~1.06 MPa, Power Supply: two common batteries with size 5.

Attention for the use of the Setting Tool: 1. No removing the back cover in the hazardous area; 2. No replacing or altering the components and configurations if they affect the Explosion - Proof capabilities of the Setting Tool; 3. Should cleanout the Setting Tool with the cleaning agent or dank cloth.

Please notice: If the Mode Switch is lying in the " Remote " position ,or lying in " Local" position but the motor is running , or the motor stops but still in the "No Acting" time, the Setting Tool is not available.

4.2 The Actuator Display

On power up and initialize the actuator's liquid crystal display (LCD) screen will show percentage open with big font (figure 4-2), the icon of the battery's electrical voltage is on the top right corner, alarm icon is on the bottom right corner. When the valve reachs to the limited position, show the valve's open percent with the simulant icon of the butterfly valve (Figure 4-3a b)

When a any button (not include "Resetting Button") is depressed directly in front of the actuator indicator window, the LCD screen will show main menu. From the main menu you can enter into parameters setting, parameters checking and status interrogating menu. Entering into menu, the LCD screen is divided into four areas: Menu Area (Parameters Setting, parameters checking and status interrogating), Alarm Area, Clew Area and Battery Status Display Area.(Figure 4-4).

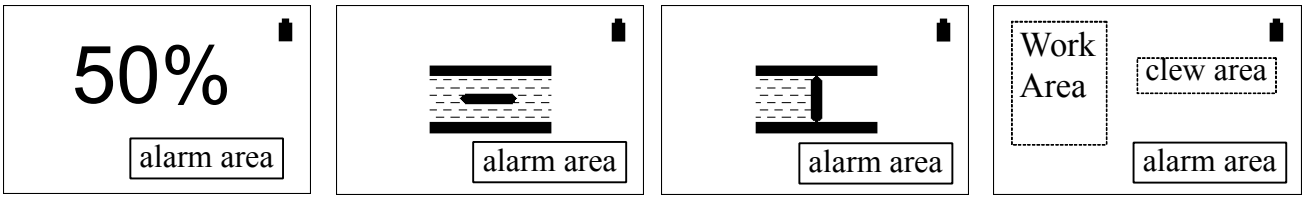
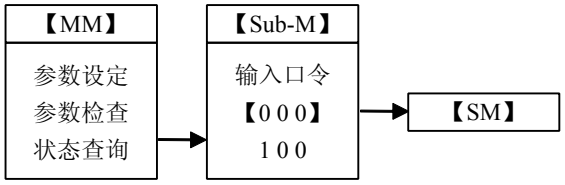
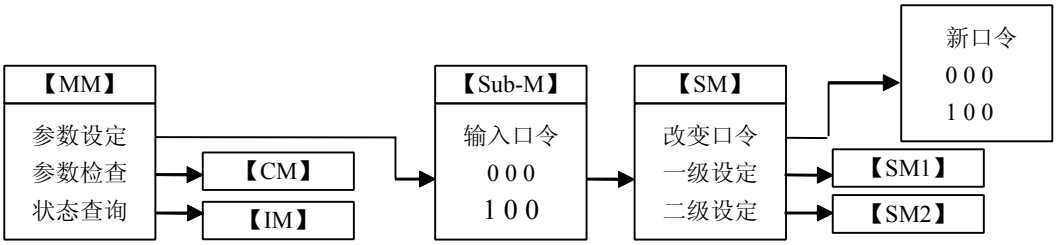


figure 4-2 figure 4-3a figure 4-3b figure 4-4

4.3 Main Menu



Notice : In order to make the latter depiction and reading advantageous, the selected item is bracketed by "[ ]" brackets. The selected item is shown reversely (that is black underside and white words), the not selected item is shown generally (that is white underside and black words). By the way , "MM"—means "Main Menu", "SM" --- means "Setting Menu", "CM"---means "Checking Menu", "IM"---means "Interrogating Menu".



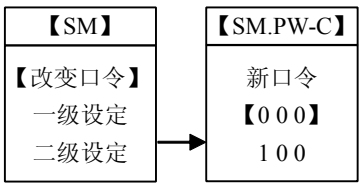
4.4 Parameters Setting [参数设定]

Before natural working we must configure the work parameters for the actuator in advance.

In the "MM" menu , use" ↓ " button to select the "参数设定" item, enter into "Sub-M" menu. In order to prevent the non – accredited person from changing the function setting, the actuator provides the password function. The "Sub-M" menu indicates that the operator must input password. The password is from 000 to 255.

If you enter the correct password in the "Sub-M" menu. And depress the "↵" button, you can enter into "SM" menu. In this submenu there are four items: (1) [改变口令]Changing Password; (2) [一级设定]Primary Setting; (3) [二级设定]Secondary Setting.

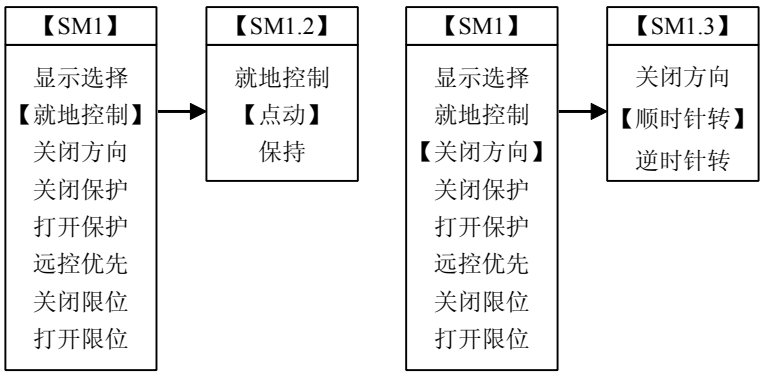
4.5 Changing Password [改变口令]



The **Changing Password [改变口令]** item allows the operator to change the primary password and enter new password over again. In the "SM" menu, you can set the new password value from 000 to 255. If the **New Password [新口令]**is in the range from 000 to 099, shift the cursor to row 000 and change it with "+", " – " button. If the new password is in the range from 100 to 255, shift the cursor to row 100 and change it with "+", " – " button. When the shown passwords are the value that you require, depress the "↵" button and confirm the

password.

Notice : In the latter parameters setting, if no special explanation, after confirming the setting parameters, only when the displayed word " 已 存 "(this words are displayed in the Clew Area) flashes, the actuator will receive this setting and return back to the upper menu.



4.6 Primary Setting [一级设定].

In the "SM" menu, use " ↓ "button select the Primary Setting[一级设定] item and depress the "↵" button, enter into "[SM1]" menu.

figure 4-5

4.6.1 Setting of the Display selection [显示选择]

When the actuator's installing direction is reverse with our line of sight, this option is used to adjust it in order to make the menu converse to be seen naturally.In the "SM1" menu , use " ↓ " button to select **Display Selection**[显示选择] item, depress "↵ " button and enter into "SM1.1" menu. The LCD screen's **Natural Display**[正显示] and **Reverse Display**[反显示] are shown in the figure 4-5.

4.6.2 Local Control Mode [就地控制] Details see section 3.2.

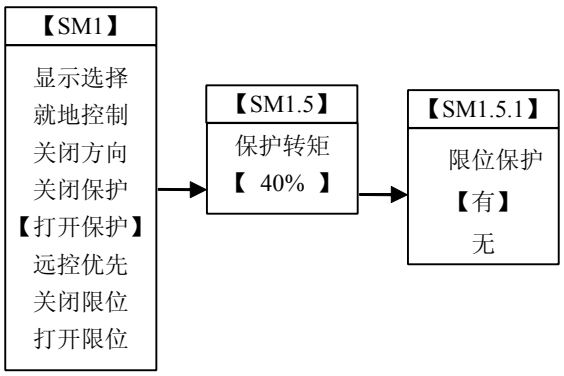
In the "SM1"menu , use" ↓ "button to select **[就地控制**（**Local Control**） item, depress "↵" button and enter into "SM1.2" menu. You can select **Push to Run[点动]** or **Maintained[保持]**. Select the required mode and depress "↵" button , the menu will return to the "SM1" menu automatically.

4.6.3 Direction to Close [关闭方向]

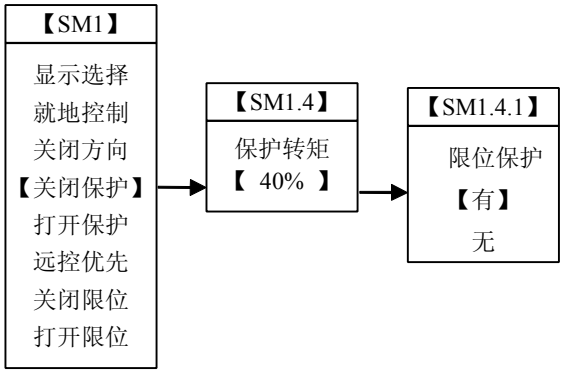
We can select the running direction of the output shaft by the [关闭方向]（**Direction to Close**） item .In the "SM1" menu, use " ↓ " button to select **Direction to Close**[关闭方向] item, depress "↵" button and enter into "SM1.3" menu. You can select the required closing-direction by the " ↓ " button. When select Clockwise to Turn [顺时针转] item the output shaft will clockwise turn; by contraries, it will anti-clockwise turn.

4.6.4 Closing Protection [关闭保护]

This item is used to select the values of the over torque protection and decide that if the limited position protection is required or not.



In the "SM1" menu, use " ↓ " button to select **Closing Protection** [关闭保护]item, depress "↵" button and enter into "SM1.4" menu , that is **Torque Protection** [保护转矩]item. You can select the required values of the torque protection (the range can be varied between 40% and 127% rated torque), depress the "↵ " button and enter into " SM1.4.1" menu. In this menu, you also select the mode of the **Limit Protection** [限位保护] for the closing direction: that is "**Yes**"[有] or "**No**"[无]. Depress the "↵" button in order to actuator can receive these setting.



Explanation: If you select "No"[无] option as the **Limit Protection[限位保护]**, when the actuator is closing, only if the torque is over the actuator will stop running. If you select " Yes"[有] option as the limit position protection, when the actuator closing, the Over Torque or **Limit Closed**[关闭限位] is detected, the actuator will stop running.

Notice 1: this item , refer to the last of the instructions----"Important Notices ".

Notice 2: If the over torque appears when the actuator is running in a certain direction, the actuator will register this information, even if the actuator resets or power up over again this note is still maintained and no running towards this direction is allowed. There are two ways to eliminate this note: (1) running towards reverse direction; (2) setting the torque protection value over again.

4.6.5 Opening Protection [打开保护]

This item is used to select the values of the over torque protection and decide that if the limit position protection is required or not. The setting way is similar to the one of the "closing protection".

Refer to the following table for limit position protection or refer to the used valve

for recommended selection.

Valve Type	Closing Limit Protection	Opening Limit Protection
Wedge gate, Cute-off	No	Yes
Butterfly, Ball, Thru-conduit, Plug , Parallel Slide	Yes	Yes

4.6.6 Remote Control Priority [远控优先]

When the **Remote Opening**[远程打开] and Remote Closing[远程关闭] signal exist at the same time, this item is used to decide that who has the priority.

In the "SM1" menu, use " ↓ " button to select " Remote Control Priority" item, depress "↵" button and enter into " SM1.6.1" menu. Use " ↓ " button to select the relevant function. When select **Open Firstly**[打开优先], if **Remote Opening**[远程打开] and **Remote Closing**[远程关闭] signal exist at the same time, only execute the opening action. When select **Close Firstly** [关闭优先], if **Remote Opening**[远程打开] and **Remote Closing**[远程关闭] signal exist at the same time, only execute the close action.

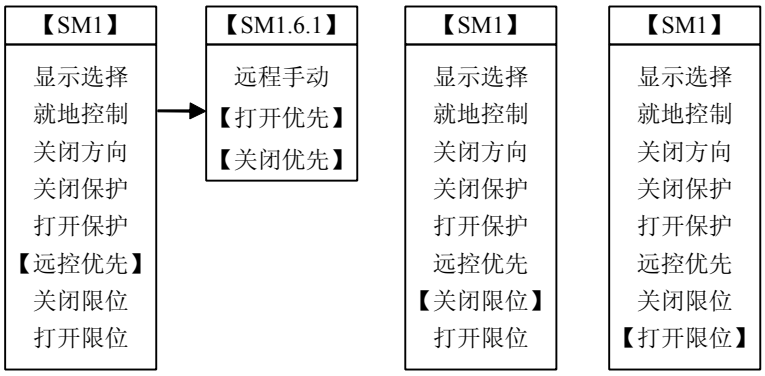
If you have selected your required item, you will depress the "↵" button and the menu returns back to the "SM1" menu.

4.6.7 Limit Closed [关闭限位]

When the actuator is lying in the Limit Closed position the **Limit Closed** [关闭限位] item is used to set the valve position value of this moment.

Turn valve manually to the full closed position. Allow for overrun by winding actuator output open up to one turn. In the "SM1" menu, use " ↓ " button to select the "Limit Closed" item, depress "↵" button and the actuator will receive the current valve position values. At this moment the red lamp should illuminate.

4.6.8 Limit Open [打开限位]



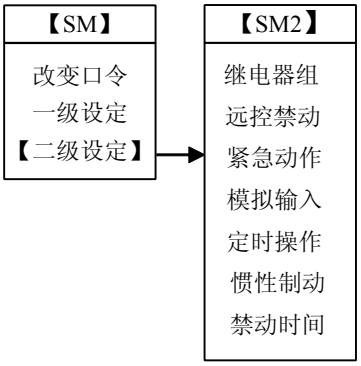
When the actuator is lying in the open limit position the **Limit Open** [打开限位] item is used to set the valve position value of this moment.

Turn valve manually to the full open position. Allow for overrun by winding actuator output closed up to one turn. In the "SM" menu, use " ↓ " button to select the **Limit Open** [打开限位] item, depress the "↵" button and the actuator will receive the current valve position values. At this moment the green lamp should illuminate.

When you set the **Limit Open** [打开限位], from closed limit position to open limit position there are 3.5 turns at the least for the output shaft of the actuator, or else the actuator will not receive the settings.

Notice: You should set the Limit Closed[关闭限位] firstly then set the Limit Open [打开限位]. When you have set the "Limit Closed", you must set the "Limit Open" over again, or else the actuator will not receive the settings and don't work naturally.

4.7 Secondary Settings [二级设定]



The **Secondary Settings** [二级设定] are the higher level for the actuator, so that we can control the actuator in the higher level.

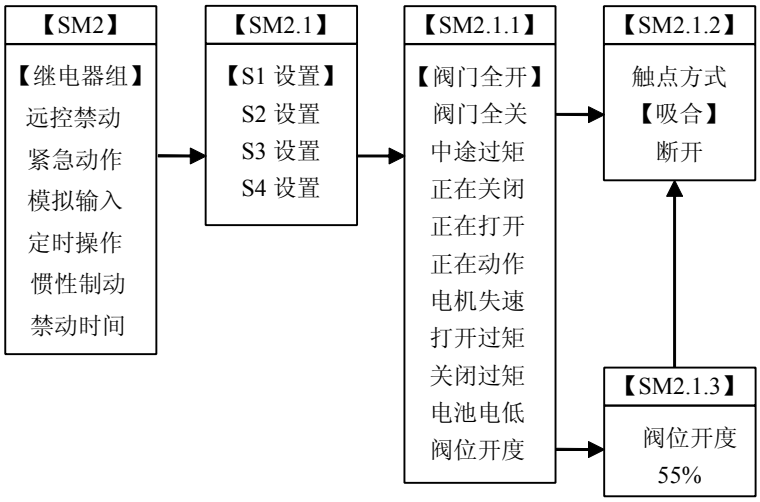
The Secondary Settings include: (1) **Relay Group**[继电器组]; (2) **Remote Control Inactive**[远控禁动]; (3) **ESD (Emergency shutdown)**[紧急动作]; (4) **Analog Input**[模拟输入]; (5) **Timing Operation**[定时操作]; (6) **Inertia Trig**[惯性制动]; (7) **Inactive Time** [禁动时间].

4.7.1 Relay Group [继电器组] (that is indication relays S1, S2, S3 and S4)

S1 to S4 relay is used to indicate a certain given status of the actuator, that is one of the relay, S1 to S4, may be sprung by the one of the following status:

Closed End Position[阀门全关],Open End Position[阀门全开], Torque Trip Mid-travel[中途过矩], Actuator Closing[正在关闭], Actuator Opening[正在打开], Actuator Rotating[正在动作], Motor Stalled[电机失速], Torque Trip Close[关闭过矩], Torque Trip Open[打开过矩], Battery Low[电池电低], Valve Position Open Percent[阀位开度].

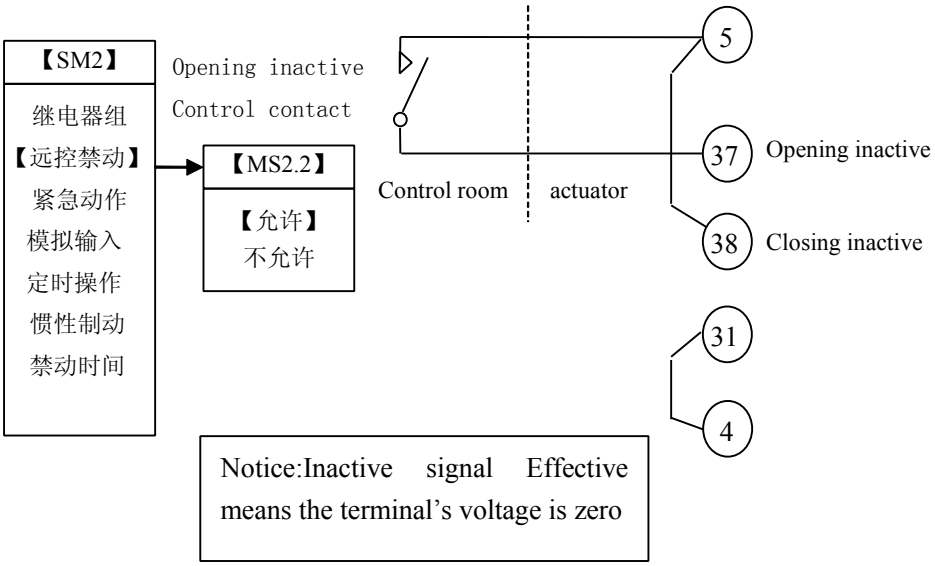
When the relay is sprung, the contact mode may be set normally open or normally closed .Make S1 as an exemplar: In the "SM2" menu we can select the "继电器组", depress the "↵"button and enter into the "SM2.1" menu. Use the "↓" button to select "**S1 设置**"(**S1 setting**) item and enter into "SM2.2.1" menu. Use "↓" button to select the required contact mode and depress "↵" button.



When you enter into “SM2.2.1” menu and select the **Valve Position Open Percent[阀位开度]**, depress the “↵” button and enter into the “SM2.1.3” menu, use “+”, “-” button to select the valve position values, depress the “↵” button and enter into the “SM2.1.2” menu.

4.7.2 Remote Control Inactive [远控禁动]

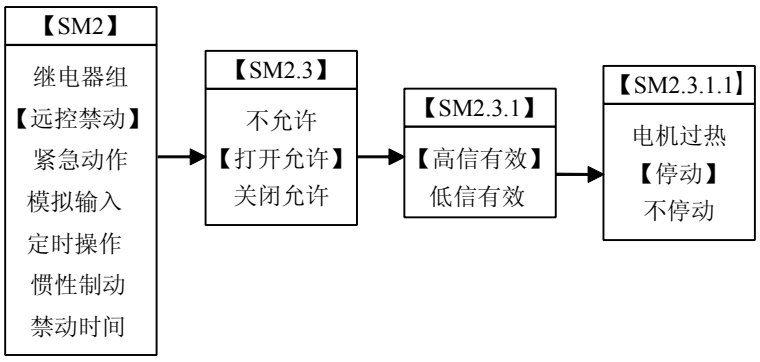
This function is used to decide that the actuator is inactive or not by two wires .By the “ ↓ ”, “↵” button select the “**Remote Control Inactive**” [远控禁动] item, enter into “SM2.2” menu, this item is set as “**Allowed**” [允许] or “**Not Allowed**” [不允许]. When you set this item as [允许], actuator allows the inactive function for the close direction and open direction has the inactive function, you should connect a jumper wire to the inactive signal terminal port of another direction. According to the right figure’s connection mode, you can realize the inactive function of the open direction (when the switch turn off), but there’s no inactive function of the close direction. If you set this item as “Not Allowed”, the inactive signal that is adscititious is not available.



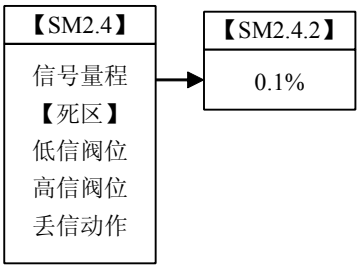
4.7.3 ESD (Emergency Shutdown) [紧急动作]

This function is used to control the actuator’s action in the emergent circumstances.

In the “SM2” menu, use “ ↓ ”button to select the “**ESD**” item, depress “↵” button and enter into “SM2.3” menu. You can select this item as **Not Allowed**[不允许](ESD function is void), **Open Allowed**[打开允许] (the actuator will execute the open action when the ESD



happens) and **Close Allowed**[关闭允许](the actuator will execute the close action when the ESD happens). If you select Not Allowed [不允许] item, depress the "↵" button, return back to the "SM2" menu. If you select **Open Allowed** [打开允许] or **Close Allowed** [关闭允许] item, depress "↵" button and enter into "SM2.3.1" menu. In this menu if you select the **High-Voltage Active**[高信有效], when the ESD signal is high level the actuator can execute the ESD function; if you select the **Low-Voltage Active**[低信有效], when the ESD signal is low level the actuator can execute the ESD function. Depress the "↵"button and enter into "SM2.3.1.1" menu, this menu requires that the user must decide the selections when the ESD is active and the motor is over temperature. If you select **Not Stop Running**[不停动], when the ESD is active and the motor is over temperature, the actuator will run to the configured position, in this case the motor may be damaged. If you select **Stop Running** [停动] item, when the ESD is active and the motor is over temperature the actuator will not run.

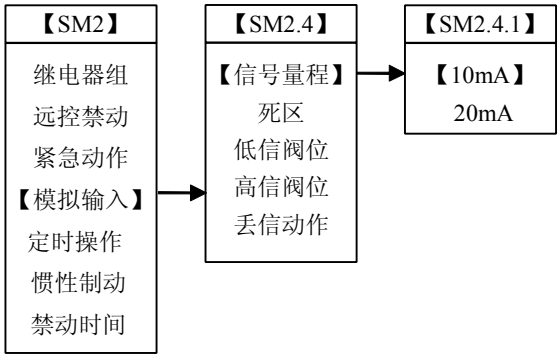


The ESD function doesn't override the following functions: (1) **Limit Protection**[限位保护]; (2) **Over Torque Protection**[过矩保护]; (3) **Remote Control Inactive**[远控禁动]; (4) Mode Switch in the Stop Position.

4.7.4 Analog Input [模拟输入]

This function is used to control the actuator run to the appointed position by the external electrical current signal.

In the "SM2" menu, select the **Analog Input [模拟输入]** item, depress the "↵" button and enter into "SM2.4" menu.



4.7.4.1 Signal Range [信号量程]

This function is use to select the range of the external DC analog electrical current or voltage that is inputted the actuator.

In the "SM2.4" menu, select the **Signal Range**[信号量程] item, depress the "↵" button and enter into the "SM2.4.1" menu. In this menu, the "10mA" means that the analog signal's input range is between 2mA and 10mA / between 0.5VDC and 2.5VDC, another item is "20mA", that means 4mA~20mA /1VDC~5VDC.

4.7.4.2 Deadband Adjustment

The deadband means that the least percent open of the valve's position when the

actuator runs again. This value is relative to the running stroke of the actuator.

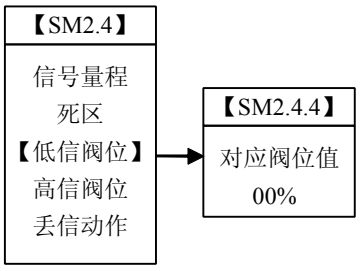
In the “SM2.4” rnenu, select the **Deadband** [死区] item, depress the “↵” button and enter into the “SM2.4.2” menu. Use the “+” or “-” key to select the deadband width. The range is 0.1% ~ 9.9%.

If the actuator hunts or responds unnecessarily to a fluctuating set point signal the deadband must be increased. If more accurate control is required the deadband may be decreased.

4.7.4.3 Valve Position Low Signal Settings

This function is used to set the low point signal of the analog electrical current input. It is used for the calibration account.

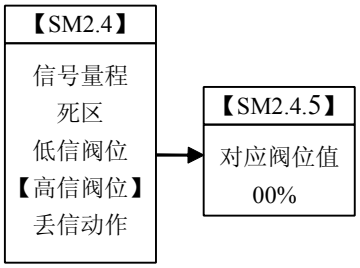
Input the low point signal to the sunflower connection terminals [27(-),26(+)]. In the “SM2.4” menu, select the **Valve Position of Low Voltage**[低信阀位] item, depress the “↵” key and enter into the “SM2.4.4”menu. Use “+” or “-” key to select the value, the range is 0~100%. Depress the “↵” key, the actuator will register this value and take it as one of the emendation of the analog input signal.



4.7.4.4 Valve Position High Signal Settings

This function is used to set the high point signal of the analog electrical current input.

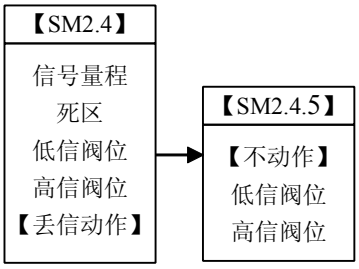
Input the high point signal to the sunflower connection terminals [27(-),26(+)]. In the “SM2.4” menu, select the **Vale Position of High Voltage**[高信阀位] item, depress the “↵” key and enter into the “SM2.4.5” menu. Use “+” or “-” key to select the value, the range is 0%~100%. Depress the “↵” key, the actuator will register this valve and take it as another one of the emendation of the analog input signal.



4.7.4.5 Action On Loss of Signal

Action on loss of signal is used to select the actuator’s action mode when the analog electrical current signal lost.

In the “SM2.4” menu, use “↓” key to select the **Action On Loss of Signal**[丢信动作] item and enter into the “SM2.4.6” menu. Use “↓” key to select **No Action**[不动作], **Valve Position of Low Voltage** [低信阀位]or **Valve**



Position of High Voltage[高信阀位]. If you select **Valve Position of Low Voltage**[低信阀位], the actuator will run to the position corresponding to low point signal. If you select **Valve Position of High Voltage**[高信阀位] the actuator will run to the position corresponding to high point signal. When the input signal is less than half of the low point signal, we think that this is the loss of signal.

4.7.5 Timing Operation [定时操作]

The Timing Operation is an optional function. When the actuator is opening or closing, in order to make the actuator act intermittently, we use this "Timing Operation". The timing operation enables pulsed "stop/start" operation by the actuator. This effectively increases the valve stroke time and can be adjusted to prevent hydraulic shock (water hammer) and flow surges in pipelines.

In the "SM2" menu, use "↓" key to select the **Timing Operation**[定时操作] item, depress the "↵" key and enter into the "SM2.5" menu, to select Allow[允许] or **Not Allowed[**不允许]. Select **Allowed**[允许] and enter into "SM2.5.1". Use the "↓" key to select the Timing Position[定时位置] item, enter into the "SM2.5.1.1" menu . Use "↓" key to select the **Open Position Effective**[开位有效] item, depress the "↵" key and enter into the "SM2.5.1.1.1" menu, Use "+" or "-" key to select the **Valve Position to Stop**[停动阀位] and **Valve Position to Start**[起动阀位], then use "↰" key to return back to the "SM2.5.1" menu. If you select the **Close Position Effective**[关位有效]. In the "SM2.5.1" menu, select the **Active Time**[动作时间] item and enter into the "SM2.5.1.2" menu. Use "+" or "-" key to set the time. "Inactive Time " item's setting is similar to the "Active Time" item. The range of active / inactive time is 1~99 seconds.

Open Position Effective[开位有效] is the pulsing operation when the actuator acts intermittently around the open limit position.

Close Position Effective[关位有效] is the pulsing operation when the actuator acts intermittently around the closed limit position.

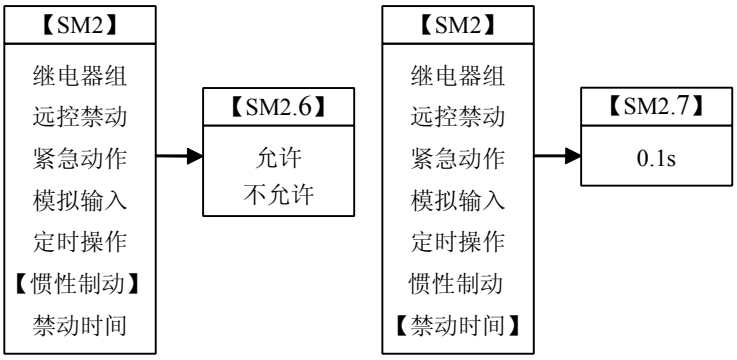
Active Time[动作时间] is the duration when the actuator executes the "Timing Operation" function.

Inactive Time[禁动时间] is the rest time when the actuator executes the "Timing Operation" function.

Valve Position to Stop[停动阀位] is the valve position that the close position is effective and that after the opening action when the actuator stops the "Timing Operation" function; or the valve position that the open position is effective and that after the closing action when the actuator stops the "Timing Operation" function.

Valve Position to Start[起动阀位] is the valve position that the close position is

effective and that after the closing action when the actuator starts the "Timing Operation" function; or the valve position that the open position is effective and that after the opening action when the actuator starts the "Timing Operation" function.



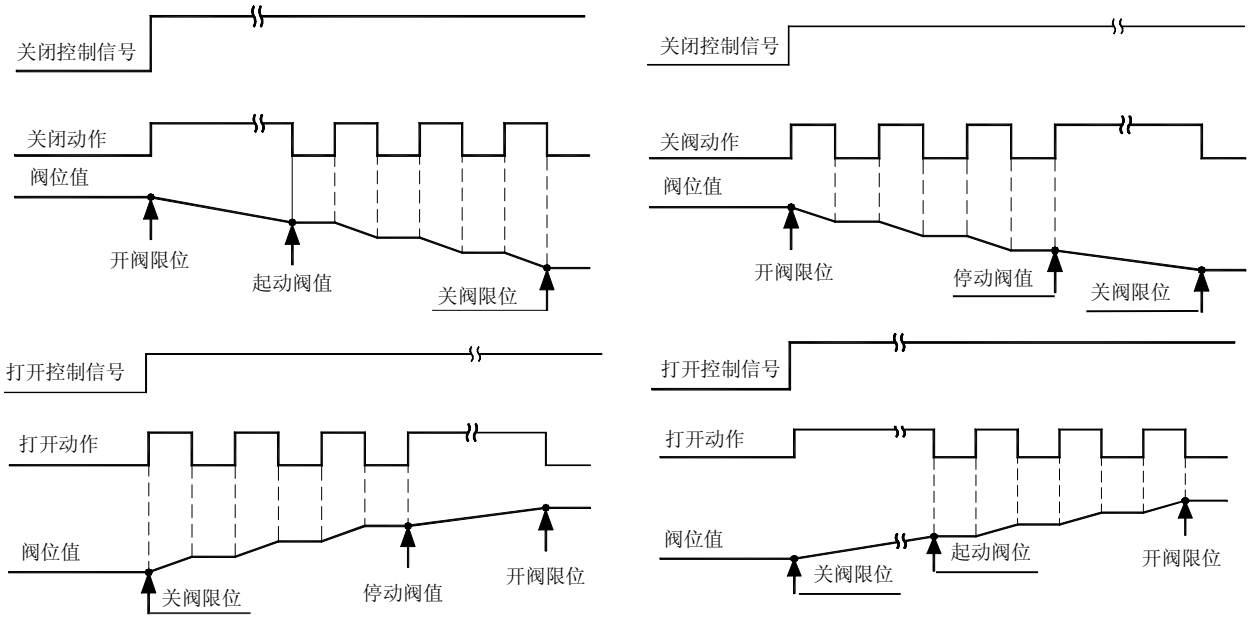
The Timing Operation's timing diagram is as follows:

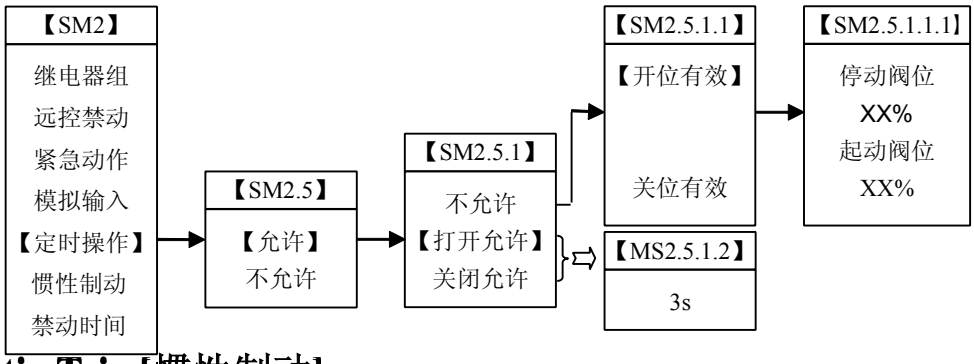
关闭控制信号：**Closing control signal** 打开控制信号：**Opening control signal**

关闭动作：**Closing action** 打开动作：**Opening action**

阀位值：**Valve position value** 开阀限位：**Limit Open**

关阀限位：**Limit Closed**





4.7.6 Inertia Trig [惯性制动]

The inertia trig is used to give an reverse energy to the motor and make the motor stop quikly so that we can obtain an accurate valve position control.

In the "SM2" menu, select the "**Inertia Trig**" [惯性制动] item and enter into the "SM2.6" menu, use "↓" and "↵" key to select the **Allowed**[允许] or **Not Allowed**[不

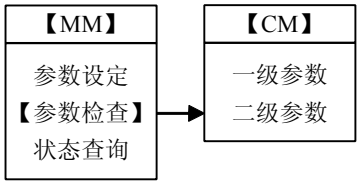
允许] item. Because of affecting the motor and screw stem this function is not used commandingly.

Notice : HKC range actuator has no “Inertia Trig” function.

4.7.7 Inactive Time [禁动时间]

The Inactive Time is the interim time of the actuator between the two consecutive actions, its value is 0.1s~9.9s. Because of overriding the prescriptive startup frequency is not allowed (HKC range startup frequency is 60 times per one hour, HKM range is 1200 times per one hour), in order to ensure this frequency we should configure the “Inactive Time” properly.

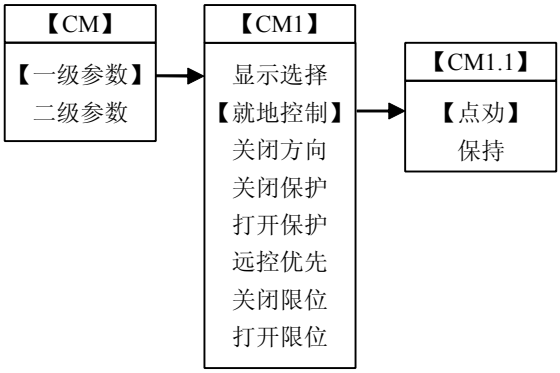
In the “SM2” menu, use “↓” and “↵” key to select the **Inactive Time**[禁动时间] item, depress the “↵” key and enter into the “SM2.7” menu. Use “+” or “-” key to select the required inactive time and depress “↵” key.



4.9 Parameters Checking [参数检查]

This function is used to check the configured work parameters.

In the “MM” menu, use “↓” key to select the “参数检查”[**Parameters Checking**] item, depress the “↵” key and enter into “CM” menu. “Parameters Checking” menu is the same as the “参数设定”[**Parameters Setting**]. Enter into the corresponding checking menu, if the Parameters Setting value is a numerical value then display the current setting value; if the Parameters Setting value is an option then the selected option will be display with the black bottom and white word in the corresponding menu.



e.g. Checking the setting value of the local control:

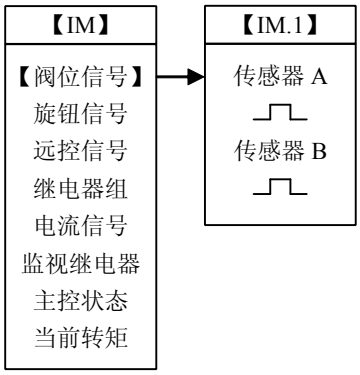
In the “CM1” menu, use “↓” key to select the “就地控制”[**Local Control**] item. depress “↵” key and enter into the “CM1.1” menu. Observing this menu, if the “点动”[**Push to Run**] is displayed with black bottom and white word that means the current value of the “就地控制” item is “保持”[**Push to Run**]. If the “保持”[**Matained**] string is displayed with black bottom and white word that means the current value of the “就地控制” item is “保持”. The other items are similar to this.

4.10 Status Interrogating [状态查询]

This function is used to interrogate the working circumstances of the actuator. If the working status is not natural, we can find the failure's position quickly by this function.

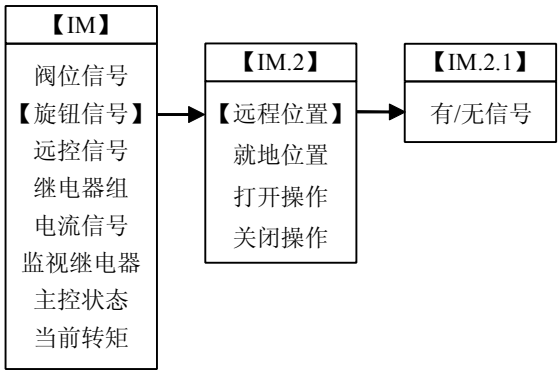
In the "MM" menu, use " ↓ " key to select the "[状态查询]" item. depress "↵" key and enter into the "IM" menu.

4.10.1 Valve Position Signal [阀位信号]



You can know the working status about the valve position's count value.

In the "IM" menu, use " ↓ " key to select the "[阀位信号]" item. depress the "↵" key and enter into the "IM.1" menu. In the "IM.1" menu, the signals of the valve position sensor A and B are displayed. At this time you can let the output shaft of the actuator turn by the local electric operation or hand operation. When the sensor energized a square wave "⎍ " is displayed, or else there's spacing, with the turning of the actuator's output shaft and if the valve position sensor A and B natural, the "IM.1" menu should be displayed and the square wave "⎍ " should be flashing. By this interrogating, we can know that the correlative parts of the valve position board and the main control board are natural or not.



4.10.2 Switch Signal [旋钮信号]

By this we can know that the switch board and the junctures are natural or not. Use " ↓ " key to select the "Switch Signal" item. depress "↵" key and enter into the "IM.2" menu. Use " ↓ " key to select the required Option, depress "↵" key and enter into "IM2.1" menu. In the "IM2.1" menu you can see the results.

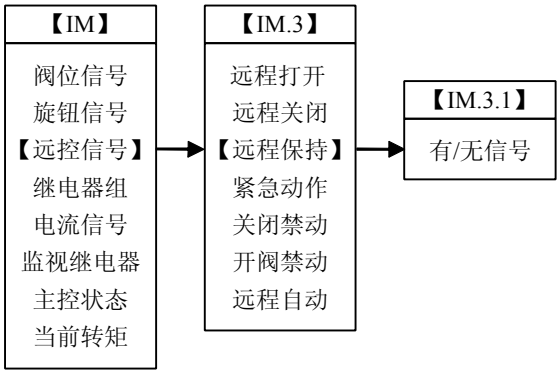
Remote Position[远程位置] ----- When the Mode Switch is in the "Remote Position" , the "是" string should be displayed , or else the "否" is displayed , when you use this operation you should close all remote signal or else the actuator may run .

Local Position [就地位置]------ When the Mode Switch in the "Local Position" , should display "是" or else display "否" .

When excuting the following items , if you don't want that the actuator runs , you should let the mode switch in the "Stop" position .

Opening Operation[打开操作] ------ Operation Switch (black switch) is in the "Opening position" , should display "是" , or else display "否" .
Closing Operation [关闭操作]------ Operation Switch is in the "Closing" position , should display "是" , or else display "否" .

4.10.3 Remote Control Signal [远控信号]



By this , we can know that the correlative parts of the remote control board and the main control board are natural or not .
Before this operation , should let the Mode Switch locate in the "Local Position" or "Stop Position" .

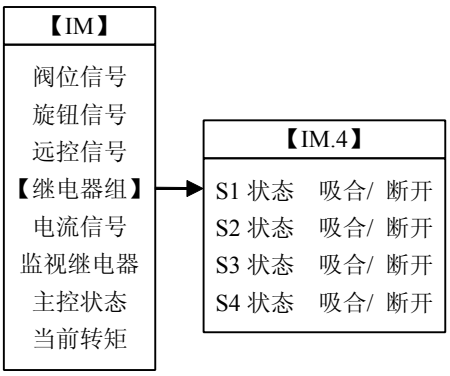
In the "IM" menu , use " ↓ " key to select the **"远控信号"[Remote Control Signal**] item , then depress "←" key and enter into "MI.3" menu . Firstly explain the following items (following are all the voltage of the actuator's sunflower function box) :
"远程打开"[**Remote Opening**] ------ when the remote opening signal is high level should display **"是"[Yes]** , or else display **"否"[No]** .
"远程关闭"[**Remote Closing**] ------ when the remote closing signal is high level , should display "是" , or else display "否" .
"远程保持"[**Remote Maintained**] ------ when the remote maintained signal is high level , should display "是" , or else display "否".
"紧急动作"[**ESD]** ------ when the ESD takes high level as effective value and the ESD signal is high level , should display "是" ; when the ESD takes the low level as effective value and the ESD signal is low level , should display "是" , or else is "否" .
"开阀禁动"[**Opening Inactive**] ------ when the "Opening Inactive" signal is low level , should display "是" , or else "否" .
"关阀禁动"[**Closing Inactive**] ------ when the "Closing Inactive" signal is low level , should display "是" , or else "否" .
"远程自动"[**Remote Automatic**] ------ when the "Remote Automatic" signal is high level , should display "是" , or else "否" .

In the "IM.3" menu use " ↓ " key to select the required item , depress "←" key and enter into the "IM.3.1" menu , display this signal as "是" or "否" signal . Depress "↖" key and return back to "IM.3" menu .

4.10.4 Relay Group [继电器组]

The Relay Group is the four relays that used to indicate the current status of the actuator . You can interrogate that the four relays' status is open or closed . Select this item , these four relays' status will be display on the right side of the LCD screen .

By this you can know that the relays of the remote control board are natural or not .

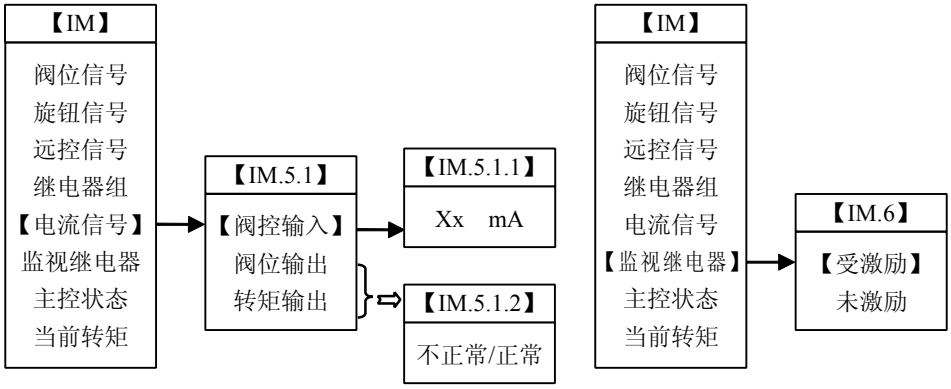


4.10.5 Electrical Current Signal [电流信号]

By this we can know that the correlative parts of the analog board and main control board are natural or not .

When you select " 阀控输入"[**Valve Control Input**] item , the actual input value of the valve position electrical current will be display on the LCD screen . When you select the "阀位输出"[**Valve Position Output**] or "转矩输出"[**Torque Output**] item , the two items' status will be displayed on the LCD screen . **Notice : ①When using this function you will stop the motor . You can let the Mode Switch Locate in the " Stop Position" or "Local Position" .**

② The Valve Position output and the torque are all that the 4mA ～ 20mA electrical current output corresponds to the percent 0～100% .



The two items are optional , please avow when ordering goods .

③ When you interrogate the "阀位输出"[Value Position Output] or "转矩输出"[Torque Output] , the intrinsic output value will be changed temporarily . But if you exit from this item's interrogation and make the output shaft running , the two output values will be recovered .

4.10.6 Monitoring Relay [监视继电器]

This function is used to monitor the status of the actuator . In the natural circumstances this relay is energized . When one of the following instances appears , this relay will be not energized .

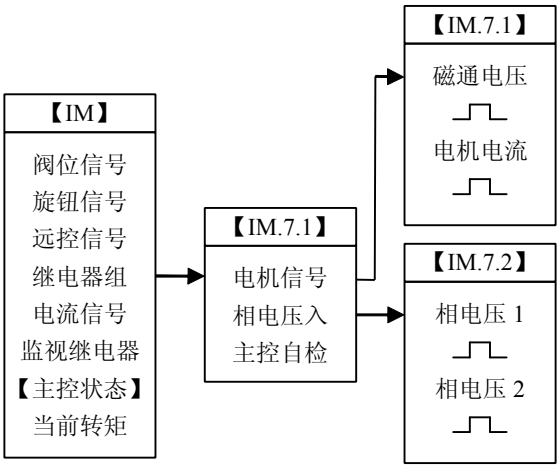
① One or more phase loss

② The internal of the system failed .

③ The Mode Switch is not in the “Remote Position” .

④ The motor is over temperature .

Use “↓” , “←” key to select the “监视继电器”[**Monitoring Relay**] item , enter into the “MI.6”menu and display “受激励”[**Energized**] or “未激励”[**De-energized**] automatically .



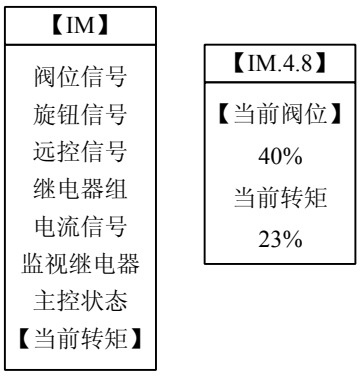
4.10.7 Main Control Status [主控状态]

By this function you can know the status of the main control board .

When select “电机信号”[**Motor Signal**] , enter into the “IM7.1” menu , at this time you can operate the actuator with the electric operation by the local mode and make the motor run . The magnetic-flux voltage and motor current signals’ flickering square wave will be displayed on the LCD screen .If there’s no square wave that means there’s no signal .When select “相电压入”[**Phase Voltage Input**] , enter into the “IM7.2” menu , at this time the flickering square wave will be displayed on the LCD screen without turning the motor , this means there’s signal . If no square wave that means there is no signal .

“磁通电压”:**Magnetic-flux Voltage**; “电机电流”:**Motor electrical current**

When select “主控自检”[**Main Control Selfchecking**], the actuator will be selfchecking and the results of the selfcheck will be displayed on the LCD screen, then the initial menu appears.



4.10.8 Current Torque [当前转矩]

By this function we can know the current torque value when the actuator is running.

Select the “当前转矩”[**Current Torque**], enter into the “IM4.8” menu. The percentage of the current torque and rated torque is displayed and the current valve position open percentage is also displayed with little numeric.

Five Display of the Alarm Signal

When the actuator is running, the corresponding alarm signal will be displayed in the alarm area of the LCD screen and it also will give indication to users:

(1) “开阀过矩”[**Torque Trip Open**]: when the actuator is opening, if the torque overrides the configured value, the actuator will stop.

(2) “关阀过矩”[**Torque Trip Close**]: when the actuator is closing, if the torque overrides the configured value, the actuator will stop.

(3) “缺相”**[Lose Phase**]: when the actuator is running, if the power supply loses phase, the actuator will stop.

(4) “电机过热”[**Over Temperature**]: when the temperature of the motor is over, the actuator will stop.

(5) “打开禁动”[**Opening Inactive**]: If the “远控禁动”[**Remote Control Inactive**] is configured as “允许”[**Allowed**] and the “Opening Inactive” signal is effective, when you execute the operation of the opening, the actuator will not run and this signal will be displayed.

(6) “关闭禁动”[**Closing Inactive**]: If the “远控禁动”[**Remote Control Inactive**] is configured as “允许”[**Allowed**] and the “Closing Inactive” signal is effective, when you execute the operation of the closing, the actuator will not run and this signal will be display.

(7) “电机失速”[**Motor Stalled**]: When the actuator is running, if the actuator can’t detect the valve position’s count value in five minutes, it will stop.

(8) “紧急关闭”[**Emergent Closing**]: If the ESD is configured as “允许”[**Allowed**] and the ESD signal is effective, the actuator will be closed.

(9) “紧急打开”[Emergent Opening]: If the ESD is configured as “允许”[Allowed] and the ESD signal is effective, the actuator will be open.

(10) “紧急有效”[**Emergent Effective**] : When the ESD is configured as “Allowed” and the ESD signal is effective, if the actuator has executed the “ESD” operation, at this time, if you want to make the actuator open or close but the ESD signal is still effective, the actuator will not run and this alarm signal will be displayed.

(11) “电源掉电”[**Power Failed**]: When the main power failed, this alarm sign will be displayed.

(12) “方向错误”[**Direction Errors**]: When you is configured the open limit in the primary settings, if the actuator’s running direction is wrong, this alarm sign will be displayed.

(13) “计数上溢”[**Count Overflow**]: When the actual valve position count value is more than the allowed maximum, this alarm sign will be displayed.

(14) “计数下溢”[**Count Underflow**]: When the actual valve position count value is less than the allowed minimum, this alarm sign will be displayed.

(15) “阀位上溢”[**Valve Position Overflow**]: When the actual valve position count value is more than the allowed difference of the limit open, this alarm sign will be displayed.

If the overflow or underflow signal appears, means that the valve position count value is wrong, should set the limit open and limit closed over again.

(16) “内存有错”[**Memory Wrong**] : this means that when the actuator is running the RAM occurs error. This error has two instances:One is stochastic disturb, this is only required that resetting the actuator and setting the limit value again. The other is that the RAM is damaged, at this time you must change the main control board. By the “主控自检**”[Main Control Selfchecking**] item you can know that the RAM is natural or not. If not natural that means the RAM is damaged, or else this alarm signal is a stochastic disturb.

(17) “阀位有错”[**Valve Position Wrong**] :When the actuator is running, if the valve position count value is wrong, this is ascribed to the remote control board, main control board or stochastic disturb.

Ensure the actuator’s secure running. HKC/HKM range must use the lubricating agent in the table, or else can not ensure the dependability of the actuator. The temperature range of the environment is –22F/-30℃ ～–160F/+70℃. In the extreme climate there’s special prescript.

Movement Viscosity is 100℃, flash point is 150℃ at least, solidifying point is not more than -45℃.

SIX Machine Maintenance:

If your actuator has run for six months, you must tighten the installation bolts.

Every actuator has been fully tested before leaving the factory to give years of trouble free operation, providing it is correctly commissioned, installed and sealed.

If your actuator can not be installed immediately store it in a dry place until you are ready to connect incoming cables.

Don’t pull out the transit cable entry plugs until you are ready to connect incoming cables.

SEVEN. Changing Cells:

When the battery’s sign is “ ” , that means the battery is low, you should change the battery quickly. If the batter’s sign is “ ” , that means the battery is exhausted , must change the battery quickly. Please change the battery when the main power is on. Before changing you must let the Mode Switch locate in the “stop” position, after your changing you will let the Mode Switch locate in the primary position.

Notice : If the battery’s sign is “ ” and the main power is failing, we do not ensure the correctness after you change the battery. In this circumstances, you

should notice that the valve position after changing is the same as the one before changing. If not the same, you should set the limit open/ closed value.

EIGHT Important Notices.

1. In order to ensure that the torque protection value of the close/open direction is rational, you must make the Mode Switch locate in the local position, let the medium flow pass by the valve and let the actuator run backwards and forwards in the open and close direction umpty times. At the same time, you should adjust the torque protection value in order to ensure that there's no over, torque in the midway.

2. In the following three instances, you must check that the limit open and limit closed values are correct or not.

1) Changing the battery while the main power failed .

2) Main power failed, the battery is exhausted naturally and no display is on the LCD screen.

3) The following alarms occur when running:

Motor stalled (without other exceptional instance, may reset it with the Setting tool).

RAM Errors (May reset it with the Setting Tool)

Valve Position Overflow

Valve Position Underflow