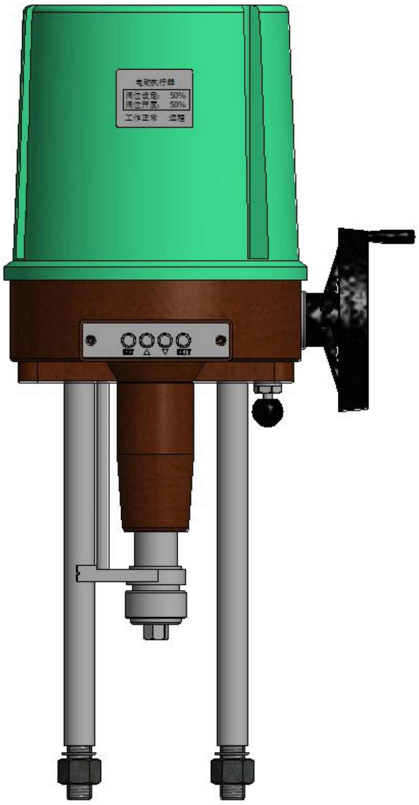
XSL Straight stroke
Electric actuator series
instructions


电动执行器
阀位设定: 50%
阀位开度: 50%
工作正常 远程
△
▽
EXIT

First read

The company does not guarantee the performance and adaptability of this product for special purposes.

The company is only responsible for this product, not responsible for indirect, special and related losses.

If information in this product manual is changed, forgive us for not informing.

Please read this manual carefully for safety warnings and precautions to ensure your safely using and maintaining of intelligent electric actuators.

This manual uses the following symbols to represent important information, please be sure to pay attention to these instructions!

⚠ **CAUTION**
Point out that if you neglect to do so, personnel injury or equipment damage may result from incorrect equipment operation.For the sake of your safety, please pay attention to these precautions.

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1、 Product overview

XSL series linear stroke electronic actuators is one of the execution unit products in the DDZ series of electric unit combining instrument. The actuator and the regulating valve body constitute the electric regulating valve, which is the execution regulating mechanism in the system of industrial process measurement and control. It can be widely used in petroleum, chemical industry, water treatment, ship, papermaking, power station, heating, building automation, light industry and other industries. It takes 220V (110V, 380V) ac power supply, 24V DC power supply as the driving power, 4-20mA current signal or 0-10V DC voltage signal as the control signal, and can make the valve move to the required position to realize its automatic control, the maximum output torque is up to 25000N.

2、 Performance characteristics and operating principles

2.1 Performance characteristics

- A variety of working group options, flexible and convenient;

  Control signal: current signal (4-20mA or other non-standard signal)

  Voltage signal (0-10V or other non-standard signal)

  Positive and negative actions can be selected to easily realize the split control mode.

  Output signal: current signal (4-20mA or other non-standard signal)

  Voltage signal (0-10V or other non-standard signal)

  Communication interface: RS485;

  Flow characteristics: linear, fast open, slow open, custom

  Valve direction of action: positive and negative selection
- Chinese and English liquid crystal display: menu operating, more humanized human-computer interaction; Easier to use;

- Self-setting of stroke: innovative mechanical design, simple and quick adjustment of stroke position, adaptive setting of the relationship between input signal and stroke, to meet the needs of different stroke valves;
- Self-diagnosis function: the actuator automatically records the working parameters during operation. When the actuator fails, the main control module finds it out and gives an alarm in time. The fault is displayed on the LCD screen and transmitted to the control center through the switch signal.
- Easier operation: innovative structural design, non-invasive operation, no need to open the case for convenient operation. Remote control/local control switch button. Handwheel prior mode, once it pops up, the actuator is protected automatically, manual operation is easier, hand wheel is safe and reliable.
- The control circuit is more reliable: the motor drive adopts contactless control, no spark and long living; Wide power adaption range, 380V power model phase adaptive, users do not have to worry about phase connection error; Circuit modules are full digital controling, no existence of mechanical potentiometer, users do not have to worry about the impact made by mechanical vibration and transport on the accuracy of product; Adopt advanced anti-interference technology, cope with the bad environment calmly, the new Watchdog technology prevent it from disturb of Dead Halt.
- Reversal delay protection for the actuator movement direction, power transmission component can be used longer;
- Louwer working noise.

2.2 operating principles

The operating principles of XSL series intelligent linear stroke electric actuators is shown in figure 1. The intelligent control unit is composed by single chip microprocessor and peripheral chip, receiving standard 4-20 mA dc signal (or voltage signal), and is the sent to the microprocessor after signal conditioning and A/D conversion, the microprocessor will sent the dealt datas to the LCD to display the adjusting result, the drive motor for control signal produced by processing the calculation, drives screw after shifting, produces mechanical stroke, feeds the position detection to the microprocessor for data processing, complete actions of signal and position corresponding relation.

In addition, the system also has the communication function, and may receive the upper computer instructions to carry on the remote digital control. Operating on the smart controller panel, the actuator can also be controlled locally through menus and buttons. The system also has fault alarm and independent position feedback output analog of 4-20mA.

3、 Main technical parameters

3.1 stroke： XSL202、XSL204: 0-50mm；
XSL208、XSL210: 0-60mm；
XSL312、XSL325: 0-100mm;

3.2 power supply： Single-phase 110V 50Hz/60Hz
Single-phase220V 50Hz/60Hz
Three-phase 380V 50Hz/60Hz
DC 24V

3.3 input signal： current signal (4 to 20 mA, or other non-standard signal), 250 Ω input impedance
Voltage signal (0 to 10 V or other non-standard signal), input impedance > 50 kΩ

3.4 output signal： current signal (4 to 20 mA or other non-standard signal), largest load impedance of 750 Ω
Voltage signal (0 to 10 V or other non-standard signal), load impedance > 10 kΩ

3.5 communication interface：RS485 modbus 协议 protocol；

3.6 resolution: minimum 1/1,000, 12-bits converter A/D circuit

3.7 control accuracy: ±0.5% ~ ±1.5% (may vary with installation conditions, expressed as a percentage of rated stroke)

3.8 hysteresis adjustment：0.1%~5.0%

3.9 environmental temperature: -10℃ ~ 60℃ (temperature below -20℃ ~ -45℃ shall be specified)

3.10 environmental humidity: maximum 90%RH (no condensation)

3.11 insulation strength: 1500V AC 1 min (input to output, power to ground)

3.12 insulation resistance:

a) shall be no less than 20 mΩ between the input terminals and cases.

B) shall be no less than 50 mΩ between the input terminals and the power terminal .

C) shall be no less than 50 mΩ between power terminal and cases.

3.13 protection level：IP65；IP67；

3.14 explosion-proof grade：see the selection table for details

3.15 Cable interface：2- M18*1.5；

3.16 shock or impact： （X，Y，Z） 10g，0.2 ～34Hz，30min

3.17 other parameters：see the selection table for details

4、 Shape and structure

4.1product structure：

The structure of the XSL intelligent linear stroke electric actuator is shown in figure 1

①cover;

②asynchronous motor;

③actuator base;

④handwheel mechanism;

⑤stroke limit switch group;

⑥position feedback potentiometer;

⑦control circuit board;

⑧stroke drive screw;

⑨connecting piece with regulating valve stem;

⑩the actuator bracket and other components.

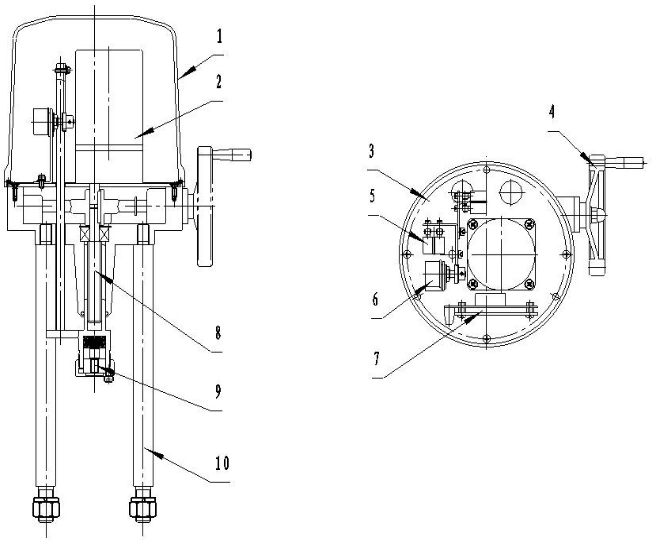


Figure 1 structure of actuator

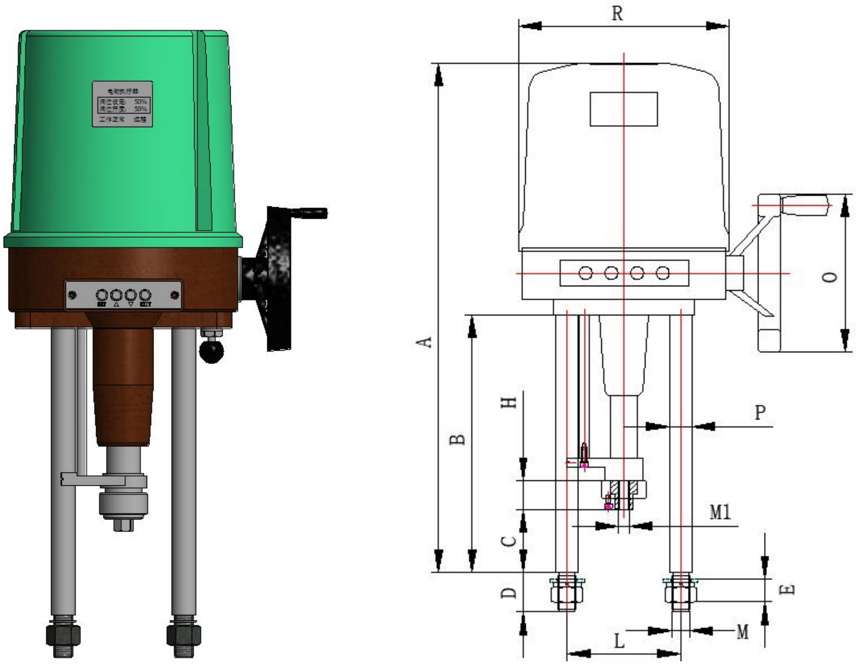


Figure 2 appearance of actuator

4.2 External dimensions of actuators sheet 1:

Model	External dimensions											
	A	B	C	D	E	H	O	L	M	P	R	M1
XSL202	460	235	65	35	20	25	φ100	100	M16	φ20	φ186	M10
XSL204												
XSL208	485	235	45	35	20	25	φ120	100	M16	φ20	φ198	M12
XSL210	505	255	55									
XSL312	717	449	70	45	25	25	φ120	155	M20	φ32	φ232	M16*1.5
XSL314												
XSL316												
XSL320												
XSL325												

Note: point C is the lowest closing point of actuator!

4.3 Specification parameters of actuators sheet 2

Model	Force KN	Speed mm/s	Stroke mm	Power V	Power W	Overtorque protection	Manual institutions	Control signal	Protecting level	Remote control	Weight K g
XSL202	2.0	1.2	50	①220V AC ②380V AC ③24V DC ④others	10	Electronic torque	Yes	①4-20mA ②0-10V ③485communication ④others	IP65 IP67	Yes	8
XSL204	4.0				15						
XSL208	8.0		60		25						10
XSL210	10.0				40						
XSL312	12.0	1.0	100	①220V AC ②380V AC ③others	90						24.5
XSL314	14.0				100						
XSL316	16.0				110						
XSL320	20.0				130						
XSL325	25.0				130						

The electrical control module is shown in figure 4.

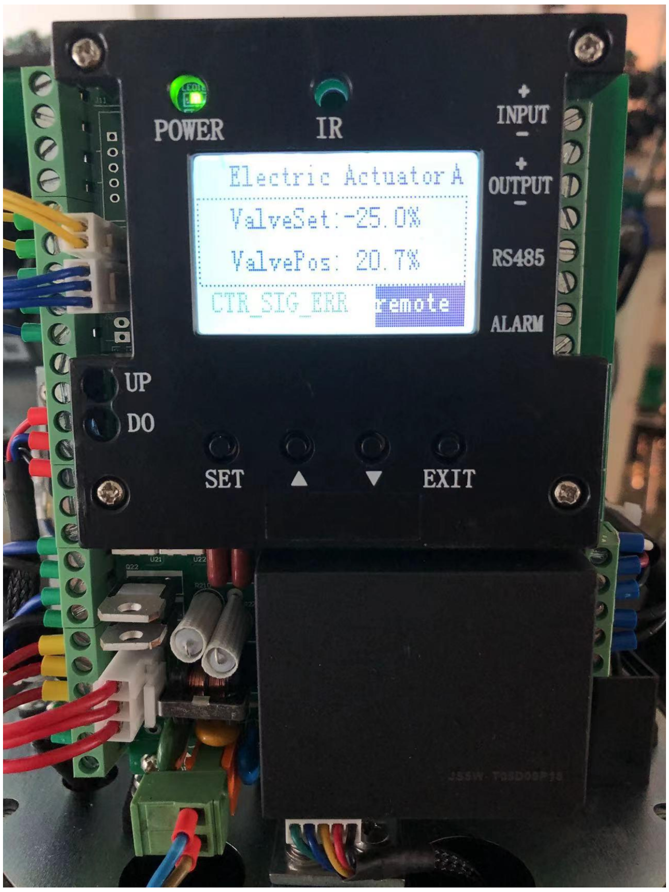
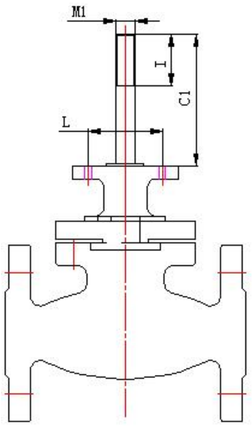

POWER
IR
INPUT
OUTPUT
RS485
ALARM
Electric Actuator A
ValveSet:-25.0%
ValvePos: 20.7%
CTR_SIG_ERR
remote
UP
DO
SET
▲
▼
EXIT

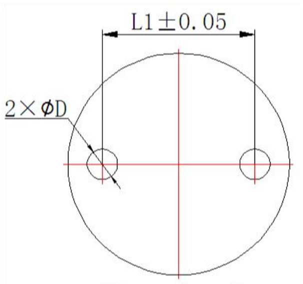
Figure 4 electrical control module

5、Installation

5.1 connection between the support and the regulating valve:

- please refer to the table below for installation of flange [flange face] and process according to the figure.
- the flange plate installed with [flange face] in the figure shall be provided by the user, and process according to the figure, the connecting screw hole of the regulating valve and the size of the actuator are matched.
- the flange plate installed with [flange face] in the figure can also be customized for the user and provided together with the actuator, but the user must provide the model or connection size of the regulator.



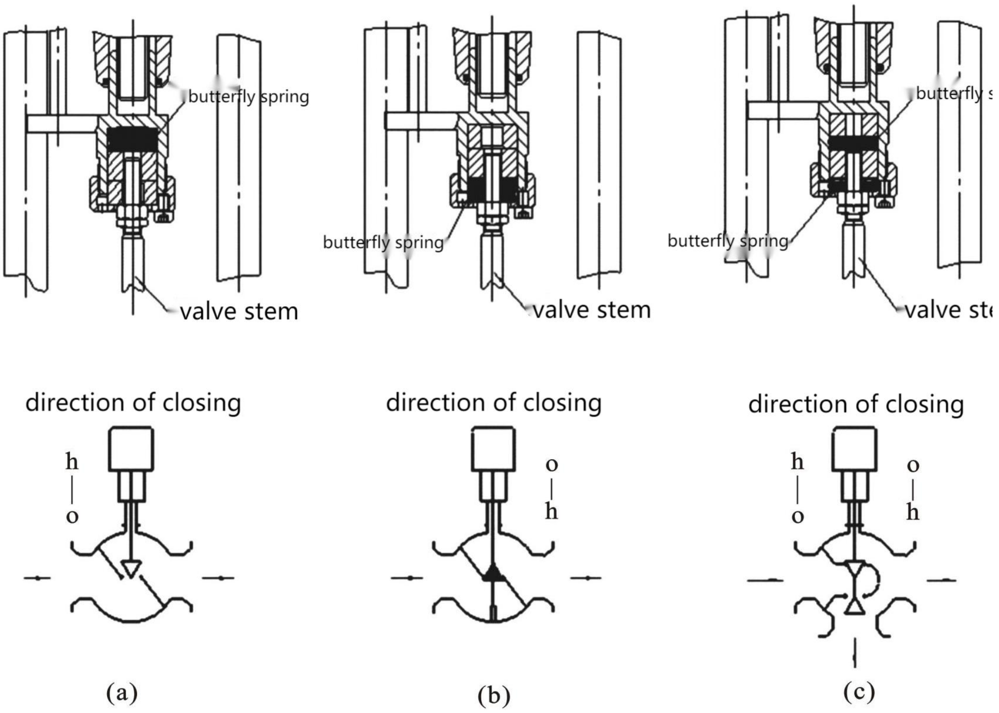


Flange face A

代号 型号	M1	I	Closing valve below C1	Closing valve up C1	Three-way valve C1	L	Flange plate	L1	D
XSL202-204	M10	50	95	155	105	100	A	φ100	2×φ17
XSL208	M12	50	75	135	90	100	A	φ100	2×φ17
XSL210	M12	50	85	155	100	100	A	φ100	2×φ17
XSL312-325	M16*1.5	65	115	230	125	155	A	φ155	2×φ22
Note: point C1 is the lowest closing point of the actuator!(mm)									

5.2 connection between valve stem and actuator push rod

The valve stem is connected to the actuator push rod as shown in figure 6. From the figure, we can learn that flexible connection structurethe is used between valve stem and actuators, the purpose is to make thrust from actuator adapt with the closing force required by regulating valve(see the relationship between thrust and elastic stroke curve), the thermal expansion caused by temperature change in compensation valve stem can also ensure the close of valve end limit for thrust and stroke.


butterfly spring
valve stem
butterfly spring
valve stem
butterfly s
butterfly spring
valve st
direction of closing
h
o
direction of closing
o
h
direction of closing
h
o
o
h

(a) (b) (c)

Figure 6 connection between valve stem and actuator push rod

In the figure (a), the valve closing direction is [h to 0] connection between the valve stem and the actuator. When the valve is closed, the push rod of the actuator produces a force transfering to the seat by the butterfly spring group to make the valve close.

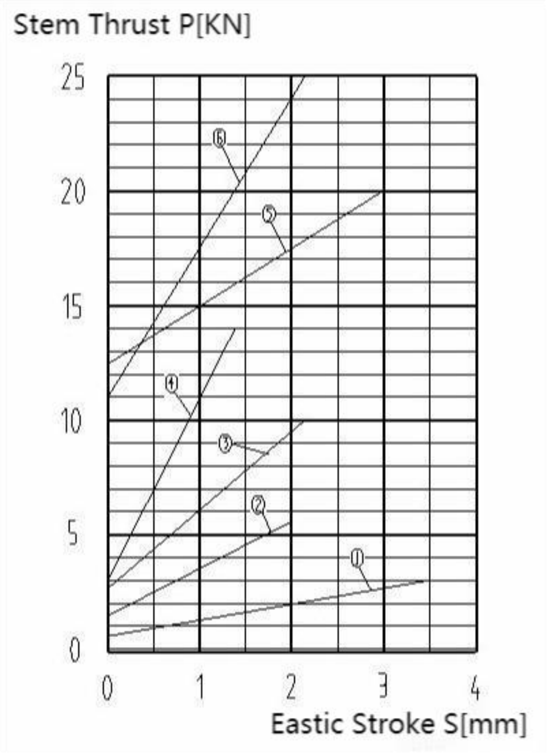
In the figure (b), the valve closing direction is [0 to h], the connection between the valve stem and the actuator. When the valve is closed, the push rod of the actuator produces a force transfering to the seat by the butterfly spring group to make the valve close.

In the figure (c), the connection between the stem of the three-way valve and the actuator is shown. When the upper channel [h to 0] valve is closed, the push rod of the actuator produces a force transfering to the seat by the upper butterfly spring group to make the valve close. Conversely, when the lower channel [0 to h] valve is closed, the push rod of the actuator produces a force transfering to the seat by the underneath butterfly spring group to make the valve close.

5.3relationship curve between stem thrust and elastic stroke:

As can be seen from figure 6, the connection structure of the valve stem and the actuator is [flexible], and the relationship curve between stem thrust and the elastic stroke is shown in figure 7.

Note: the model of the actuator corresponding to the code in the figure:



①—XSL202

②—XSL204

③—XSL208、210

④—XSL312、314

⑤—XSL316

⑥—XSL320、325

Figure 7 the relationship curve between stem thrust and the elastic stroke

5.4adjustment method for elastic stroke [S] :

The adjustment of the elastic stroke [S] is shown in figure 8. The adjustment method of elastic stroke [S] for positive and negative actions of regulating valves is described as follows:

Adjusting procedure of positive action regulating valve (applicable without electric torque actuator) :

When the valve is a lower closing valve, as shown in left picture in figure 8;

The actuator switches to the ground position; Press the control key (down) to make the stem stroke move down. When the stem is closed in place and not moving, the actuator will continue to press down on the corresponding thrust stroke as shown in figure 7. Then rotate the down stroke adjustment block to the touch limit switch cam to confirm the closing position.

Press the control key (up) to the required valve opening stroke, rotate the up stroke adjustment block to the touch limit switch cam to confirm the fully open position, and then enter the valve calibration menu (see introduction 7.2).

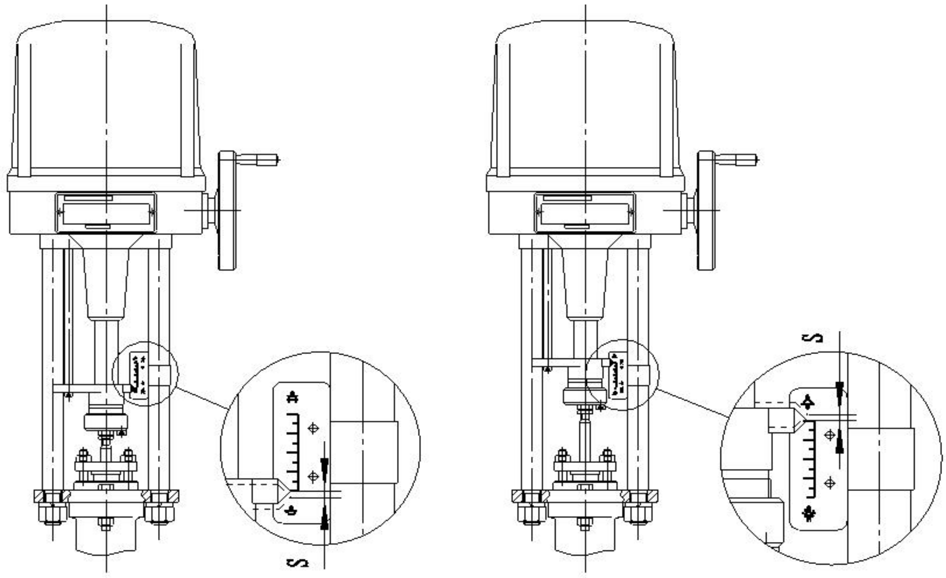


Figure8 Flexible stroke [S] adjustment reference diagram

Adjusting procedure of negative action regulating valve (applicable without electric torque actuator) :

When the valve is the upper closing valve, as shown in right picture in figure 8;

The actuator switches to the ground position; Press the control button (upward) to move the stem stroke upward. When the stem is closed in place and not moving, the actuator will continue to pull up the corresponding thrust stroke as shown in figure 7. Then rotate the up stroke adjustment block to the touch limit switch cam to confirm the closing position.

Then press the control key (down) to the required valve opening stroke, rotate the lower stroke adjustment block to the touch limit switch cam to confirm the fully open position, and then enter the valve calibration menu (see 7.2 introduction).

Note: the upper closing valve is adjusted to complete the subsequent setting menu for positive and negative action control mode.

Note: when the three-way valve is adjusting, close and fully open position must be set off-force.

Electronic torque actuators do not need to adjust the above two steps, the program will automatically identify and adjust the stroke range in the valve position check prompt operation according to 7.2 !

5.5the adjustment of the limit switch

Actuators and regulating valve connection must be set actuators to meet the requirements of valve control. Depending on the type of valve, adjust the limit switch of actuator to stroke or off- power/stroke, adjustment of the limit switch is shown in figure 9, left as the lower limit, right as the upper limit.

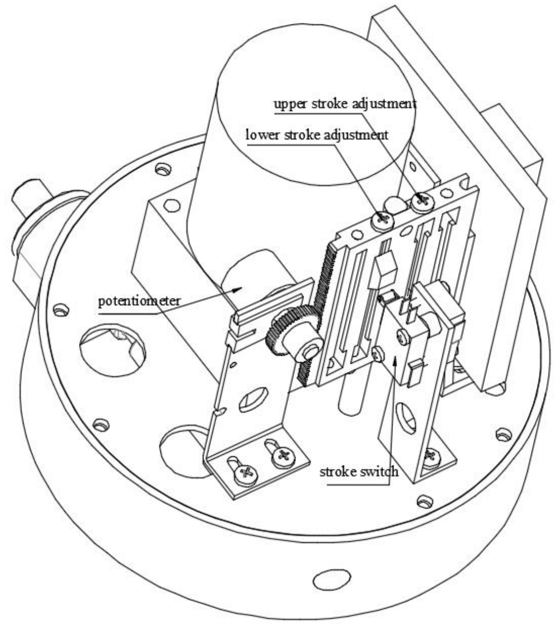


Figure9 Convex block and limit switch on the rack plate

Principles of adjustment:

(1) For the straight valve, first set the closing position according to the off-force/stroke, and then set the opening position according to the rated stroke of the valve.

(2) For the three-way valve, set two terminal positions according to the off-force/stroke, and then determine the actuator limit switch according to the off-force/stroke.

(3) Electric actuator handwheel operation, make the valve core contact seat, when the stem begins the axial action, the stem force is the reaction force from the butterfly spring (but manual limit is not recommended).

(4) continue to manually operate in the same direction to make the valve stem downward, butterfly spring is compressed to the corresponding value of the actuator shown in figure 8, to ensure the required shutdown force and prevent leakage (but manual limit is not recommended).

(5) the product debugging after the connection of the actuator and the regulating valve installation must be conducted in three synchronizations: the position of the regulating valve, the position of the stroke switch, and the position of the corresponding signal.

6、Electrical wiring

6.1 matters needing attention

(1) the cable interface is processed into 2-M18 *1.5, which is fixed with the cable through the coil before delivery;

(2) if the user does not use either cable interface, please keep the plug undisturbed;

(3) please be sure to seal the joint with rubber or metal pad after wiring to prevent water;

(4) the factory cannot guarantee the performance of the actuator if the user uses inappropriate components outside our scope of supply;

(5) be sure to connect the wires according to the wiring diagram provided to confirm whether the electrical parameters, such as power supply, are correct;

(6) be sure to keep the internal actuator dry and clean without impurities;

(7) ensure the terminal connection is firm;

6.2 electrical wiring diagram

(1)Information display (LCD Chinese display)

(2)potentiometer signal input

(3)indicator light of actuator output shaft off (red)

(4)indicator light of actuator output shaft on (green)

(5)motor control signal output

(6)220V power input terminal

(7)signal input, output, RS485, alarm terminal

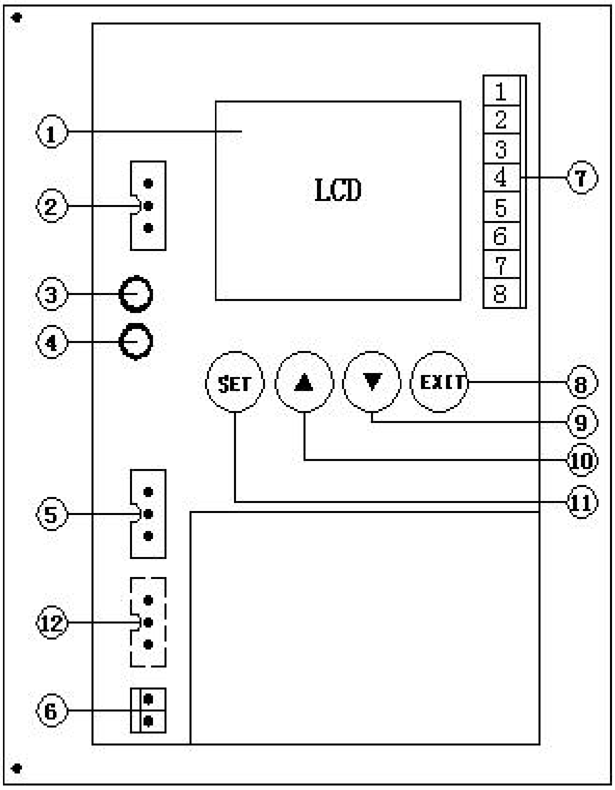
(8)menu exit key (and local/remote switch operation)

(9)data "-" (both local and downward operation)

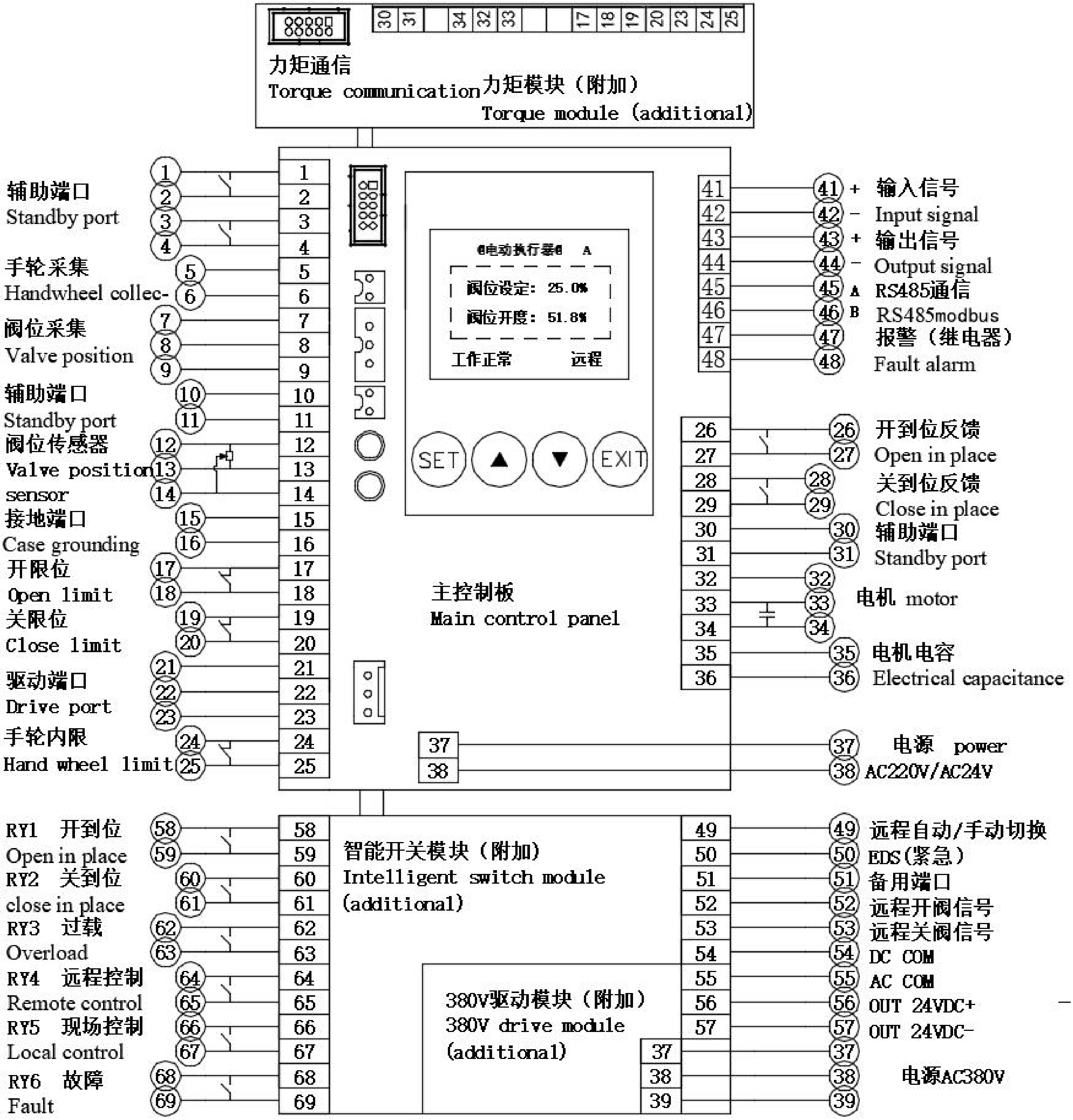
(10)data"+" (both local and upward operation)

(11)parameter setting key (switch menu, selection, determine)

(12)control switch interface (only with this interface for DC panel)

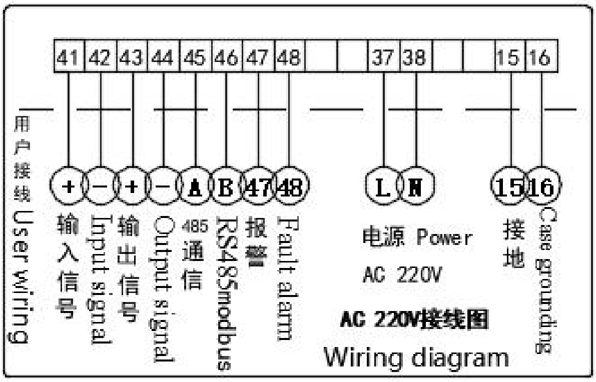


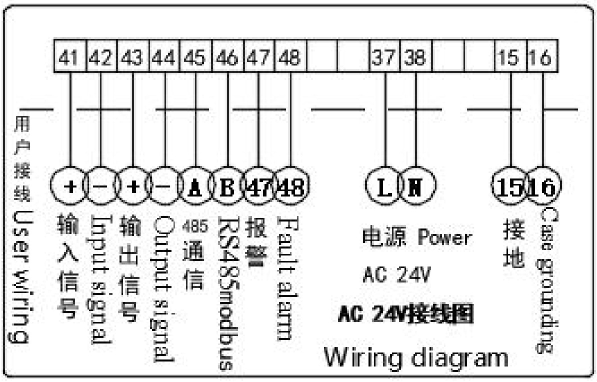
6.3 wiring instructions of bottom plate (AC and DC interfaces) as shown in figure 10:

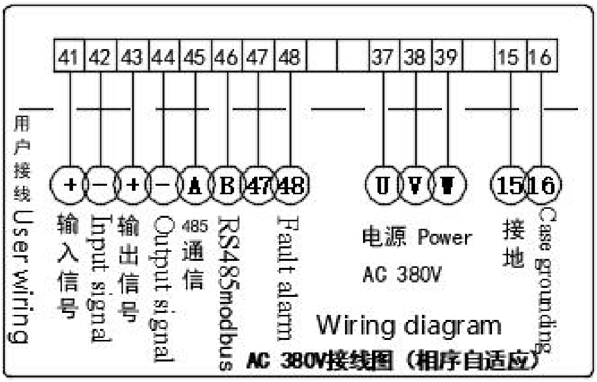

30 31 34 32 33 17 18 19 20 23 24 25
力矩通信
Torque communication
力矩模块（附加）
Torque module (additional)
辅助端口
Standby port
手轮采集
Handwheel collec-
阀位采集
Valve position
辅助端口
Standby port
阀位传感器
Valve position sensor
接地端口
Case grounding
开限位
Open limit
关限位
Close limit
驱动端口
Drive port
手轮内限
Hand wheel limit
电动执行器 A
阀位设定：25.0%
阀位开度：51.8%
工作正常
远程
SET
▲
▼
EXIT
主控制板
Main control panel
+ 输入信号
− Input signal
+ 输出信号
− Output signal
A RS485通信
B RS485modbus
报警（继电器）
Fault alarm
开到位反馈
Open in place
关到位反馈
Close in place
辅助端口
Standby port
电机 motor
电机电容
Electrical capacitance
电源 power
AC220V/AC24V
RY1 开到位
Open in place
RY2 关到位
close in place
RY3 过载
Overload
RY4 远程控制
Remote control
RY5 现场控制
Local control
RY6 故障
Fault
智能开关模块（附加）
Intelligent switch module
(additional)
380V驱动模块（附加）
380V drive module
(additional)
远程自动/手动切换
EDS(紧急)
备用端口
远程开阀信号
远程关阀信号
DC COM
AC COM
OUT 24VDC+
OUT 24VDC-
电源AC380V

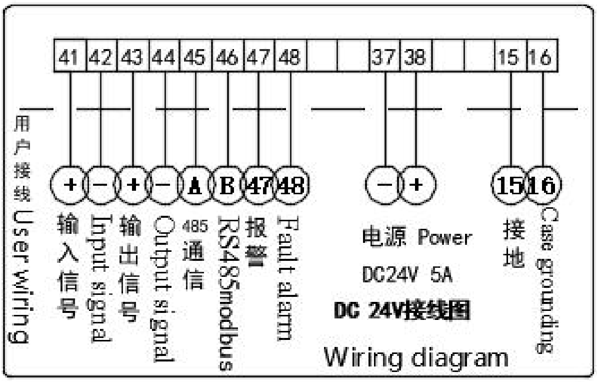
Note: the factory standard actuator is with the control mode of analog input and output 4-20mA control signal, modes such as 0-10v signal control, intelligent switch control, RS485 communication control need to be customized with our business department.

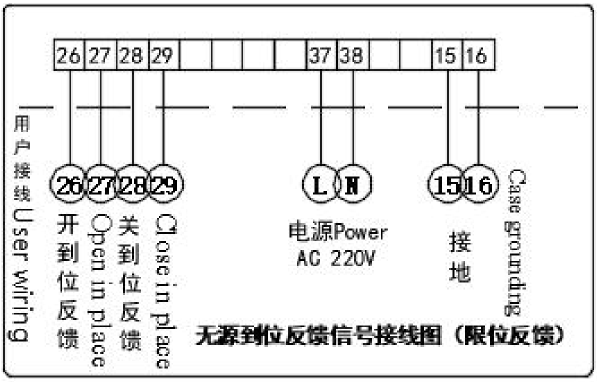
6.4 wiring instructions for 380V AC, as shown in figure 11:

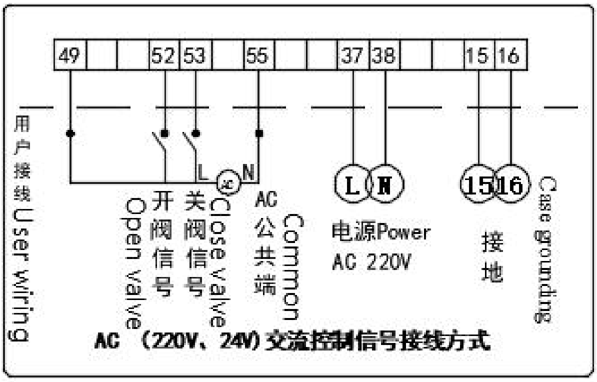

41 42 43 44 45 46 47 48 37 38 15 16
用户接线 User wiring
+ − + − A B 47 48 L N 15 16
输入信号 Input signal
输出信号 Output signal
485通信 RS485modbus
报警 Fault alarm
电源 Power AC 220V
接地 Case grounding
AC 220V接线图
Wiring diagram

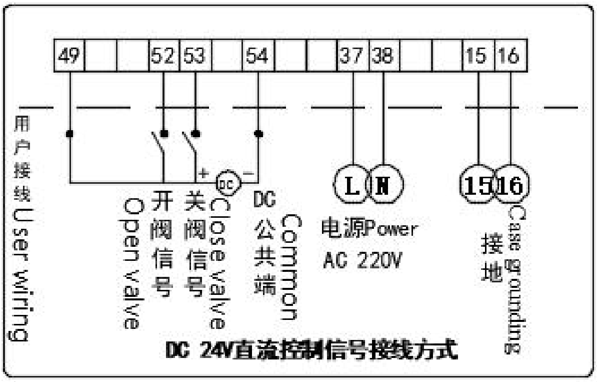

41 42 43 44 45 46 47 48 37 38 15 16
用户接线 User wiring
+ − + − A B 47 48 L N 15 16
输入信号 Input signal
输出信号 Output signal
485通信 RS485modbus
报警 Fault alarm
电源 Power AC 24V
接地 Case grounding
AC 24V接线图
Wiring diagram

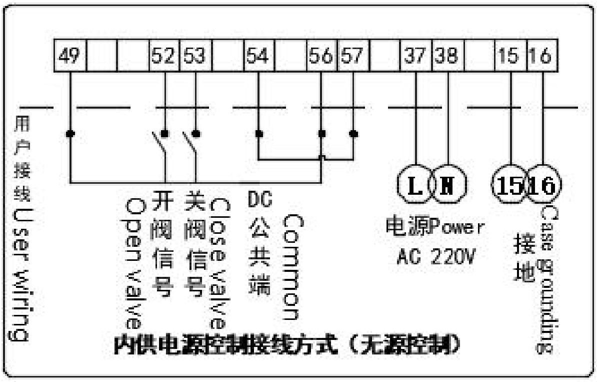

41 42 43 44 45 46 47 48 37 38 39 15 16
用户接线 User wiring
+ − + − A B 47 48 U V W 15 16
输入信号 Input signal
输出信号 Output signal
485通信 RS485modbus
Fault alarm
电源 Power AC 380V
接地 Case grounding
Wiring diagram
AC 380V接线图（相序自适应）


41 42 43 44 45 46 47 48 37 38 15 16
用户接线 User wiring
+ − + − A B 47 48 − + 15 16
输入信号 Input signal
输出信号 Output signal
485通信 RS485modbus
报警 Fault alarm
电源 Power DC24V 5A
接地 Case grounding
DC 24V接线图
Wiring diagram


26 27 28 29 37 38 15 16
用户接线 User wiring
26 27 28 29 L N 15 16
开到位反馈 Open in place
关到位反馈 Close in place
电源Power AC 220V
接地 Case grounding
无源到位反馈信号接线图（限位反馈）


49 52 53 55 37 38 15 16
用户接线 User wiring
L N
开阀信号 Open valve
关阀信号 Close valve
AC公共端 Common
L N 15 16
电源Power AC 220V
接地 Case grounding
AC （220V、24V）交流控制信号接线方式


49 52 53 54 37 38 15 16
用户接线 User wiring
+ DC −
开阀信号 Open valve
关阀信号 Close valve
DC公共端 Common
L N 15 16
电源Power AC 220V
接地 Case grounding
DC 24V直流控制信号接线方式


49 52 53 54 56 57 37 38 15 16
用户接线 User wiring
开阀信号 Open valve
关阀信号 Close valve
DC公共端 Common
L N 15 16
电源Power AC 220V
接地 Case grounding
内供电源控制接线方式（无源控制）

7、 parameters setting

This section introduces the functions, display contents, parameter setting and menu structure of the actuator. The LCD consists of 64 characters, divided into four lines of 16 characters (8 Chinese characters). There are four buttons on the panel with the following functions:

"SET" menu entery or confirmation

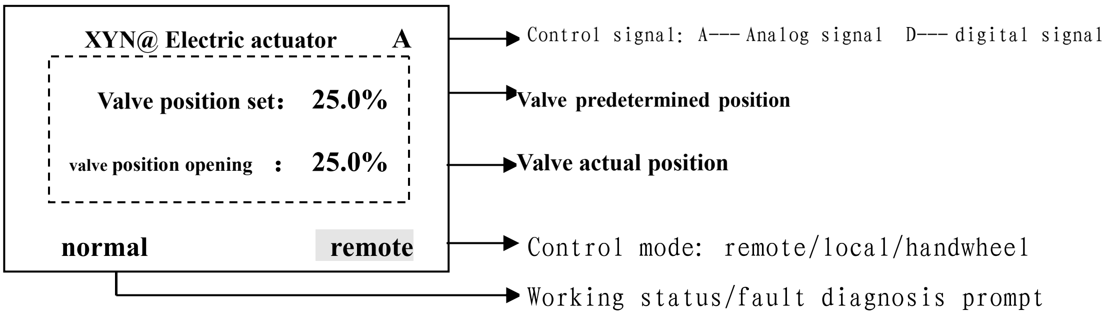
“▼” used to select the next menu or to reduce the value entered

“▲” used to select the previous menu or to increase the value entered

"EXIT" return to the running state or to the previous menu

7.1 normal operation of LCD display content

During normal operation, LCD display contents are as follows:


XYN@ Electric actuator A
Valve position set： 25.0%
valve position opening ： 25.0%
normal
remote
Control signal: A--- Analog signal D--- digital signal
Valve predetermined position
Valve actual position
Control mode: remote/local/handwheel
Working status/fault diagnosis prompt

7.2 Menu structure

Number	Main menu	Sencondary menu	Notes
1	01-equipment information	01-number	Product delivery identity
2		02-hardware verxion	Hardware of Control panel
3		03-software version	Software version
4		04-protocol version	Communitation protocol vertion
5	02-Valve position	01- Automatic stroke check	Automatic setting of valve stroke

6	calibration	02-Manual stroke check	Manual setting of valve stroke
7	03- Sensor check (permission control)	01- Analog input check	Internal parameter debuggings and testing
8		02- Analog output check	
9		03- Valve position sensor adjustment	
10		04-TrvK_10mm/90°	
11		05-XYN_EEP_MAIN	
12		06-XYN_EEP_BAK	
13	04- Control performance (permission control)	01- stroke upper incision	Please read carefully: 7.3 travel limit and incision under the parameter setting of electric actuator
14		02- Stroke lower incision	
15		03- Filter coefficients	Signal filtering constant
16		04- hysteresis	Control precision
17		05- Motor reversal delay	Motor response signal variation time
18		06- Flow characteristic	Valve flow control characteristics
19		07- Valve action direction	Mechanism execution mode
20	05- Control signal (permission control)	01- Control signal selection	Control signal type can be set
21		02- Restart control mode	Please read carefully: 7.3 valve position setting control signal selection under parameters setting of electric actuator
22		03- Upper limit of analog quantity	
23		04- Lower limit of analog quantity	

24		05- Positive and negative signal action	Actuator mode
25		06- Signal fault handling	Maintain, open, close and set; When setting is selected, press the setting key to enter the sub-menu to modify the handling location of fault that needs to be set
26		07- signal fault detection enablement	
27	06- Alarm stop setting (permission control)	01- Handwheel switch available	You can set whether to stop the actuator when a fault occurs, but the main screen will still prompt the fault.
28		02- Running direction fault	
29		03- Memory failure	
30		04- Valve stoppage failure	
31	07-LCD and communication	01- Backlight time	LCD screen light time adjustment
32		02- Gray-scale set	Set display font brightness
33		03- Automatic screen lock	Protect the actuator from being operated by irrelevant personnel
34		04- Permissions password	Password can be set to lock the main menu to prevent irrelevant personnel operations
35		05- Machine address	Specific model valid
36		06-Communication baud rate	Specific model valid
37	08-Language		Chinese/English selection

7.3 parameters setting of electric actuator

➢ Enter the menu

When the electric actuator is running normally, press "SET" to enter the main menu immediately. Open the menu, press "▼" or "▲" to scroll through the 9 parameter setting functions, press "SET" to enter the selected secondary menu, and press "EXIT" to return to the previous menu. The sub-menu operates similarly.

➢ *L*ocal/remote switch

When the electric actuator is running normally, press "EXIT" to switch between local/remote control mode. In the "local" control mode, the valve's current actual position can be changed via the "▼" or "▲" key. In "remote" control mode, the control signal source (analog signal 4-20mA, digital signal RS485 or other bus interface) sets the position of the valve, and the electric actuator drives the valve to the corresponding position.

⚠ **CAUTION**
When entering the handwheel operation state, the electric actuator will not automatically return to the automatic mode unless the handwheel is reset to the remote state.

➢ STroke limit and incision

The stroke limit is to limit the actual opening range of the valve by setting software parameters. Select "control performance" from the main menu, and set "stroke upper limit" and "stroke lower limit" from the secondary menu,

Stroke incision is to ensure proper seat closing force. Especially when the valve wears after running for a period of time, the setting of this parameter must be paid attention to. When the set value of the valve after the control signal conversion is less than the stroke lower incision value, the actuator drives the valve to close until the lower valve stroke limit switch acts. Similarly, when the set value of the valve after the conversion of the control signal is larger than the stroke upper incision value, the actuator drives the valve to open until the upper valve stroke limit switch acts. This can ensure that the valves are all closed with enough sealing force, and can also ensure fully open.

For example, the lower stroke incision value is set to 0.5%. When the control signal is 4mA, the set value of valve after the convertion 0% is less than the lower stroke incision value. The actuator drives the valve to close, even if the actual position of the valve is within the allowable hysteresis range of 0%, it continues to close until the lower valve stroke limit switch acts.

However, if the lower stroke incision value is set to 0.0%, when the control signal is 4mA, the set value of valve after the convertion 0% is not less than the lower stroke incision value, the actuator drives valve to close, and the actual position of the valve stops the operation within the allowable hysteresis range of 0% .

⚠ **CAUTION**
When the parameters of "stroke incision" and "stroke limit" meet simultaneously, the function of "stroke incision" takes precedence. Please note the recommended values for the parameters in menu structure 7.2.

- ***Automatic stroke calibration: see the debugging and calibration section***
- ***Mannual stroke calibration: see the debugging and calibration section***
- ***Sensitivity setting***

The sensitivity setting of the actuator involves three parameters: "filter coefficient", "hysteresis" and "motor reversal delay". According to the menu structure, select entery respectively.

In addition to the strict anti-jamming hardware circuit design, the electric actuator also adopts the software digital filter anti-jamming method. The larger the value of "filter coefficient"is, the more obvious the filtering effect will be, but the response time will be prolonged, and the default value is 5.

" Hysteresis " directly affects the valve position control accuracy, extremely small hysteresis value setting may lead to valve shock. The default value is 0.5%. When valve shock occurs, the value should be appropriately increased in combination with the operating characteristics of the valve.

"Motor reversal delay" can prevent damage from the reaction force to the actuator power transmission components when the control direction of the valve changes in order to greatly improve the life of the actuator and valve. If the parameter value is too large, the response time will be prolonged. The default value is 3 seconds.

⚠ **CAUTION**
Normal users can achieve better control effect by using the default value of sensitivity parameters 3 . It is not recommended to modify.

➢ Flow curve selection

Select "control performance" in the main menu and set the "flow characteristics" in the secondary menu. Four choices of linear, equal percentage (R=50), fast open and custom. Actuators with software version lower than S26 do not support custom flow curve selection. Flow curve is related to the running rule of the valve, please use them carefully.

➢ Valve action direction

Positive and negative acting selection to suit different valve types. Default value, positive action.

➢ Selection for the control signal setting of valve position

Selection for the control signal setting of valve position involves two parameters: "control signal selection" and "restart control mode". According to the menu structure table, select entery respectively.

"Control signal selection" has two options of analog signal control and digital signal control. (1) When analog signal control is selected, the valve position setting is converted from the input 4-20mA current signal (or voltage signal). The letter "A" is displayed in the upper right corner of the LCD during normal operation;(2) when digital signal control is selected, the valve setting position is converted from RS485 bus (or other bus) communication signal, and the letter "D" is displayed in the upper right corner of the LCD during normal operation.

"Restart control mode" has three options: last selection, analog signal control, and digital signal control.(1)

When the last selection is maintained, the control signal selected last time will be used as the control signal source after the electric actuator is reenergized;(2) when the analog signal control is selected, the electric actuator will force the analog control signal as the control signal source every time it is reenergized;(3) when the digital signal control is selected, the electric actuator will force the digital control signal as the control signal source every time it is reenergized.

➢ Stroke divided control

In general, two control valves are used in series, one on and one off. The three parameters involved are "upper limit of analog quantity", "lower limit of analog quantity" and "positive and negative actions of signal". According to the menu structure table, select entery respectively. After the joint setting of three parameters, the stroke divided control of the valve can be realized, as shown in figure 12.

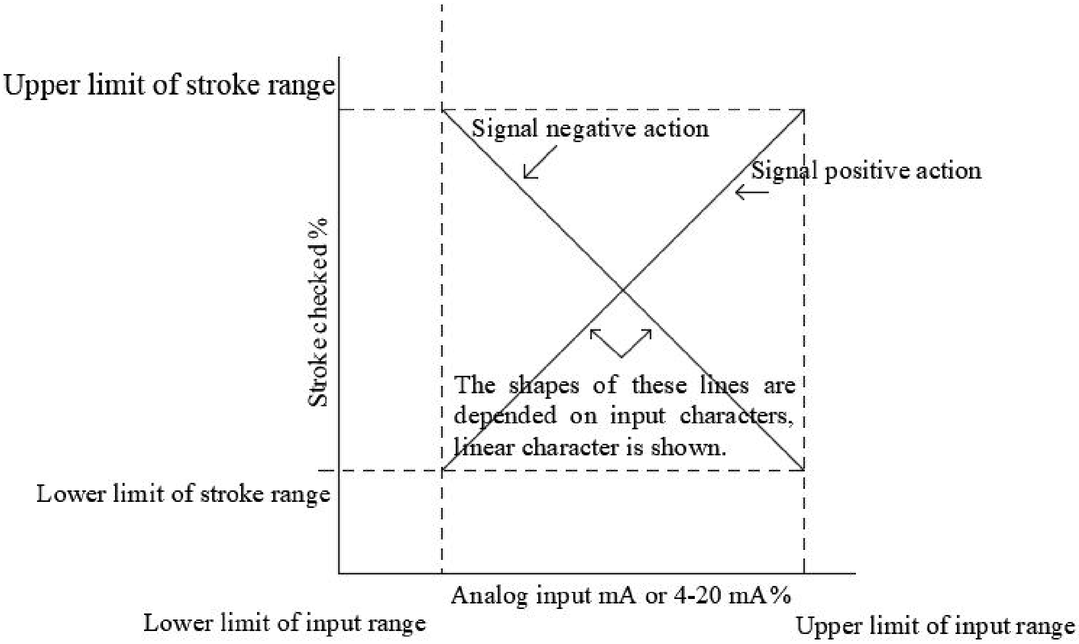

Upper limit of stroke range
Signal negative action
Signal positive action
Stroke checked %
The shapes of these lines are depended on input characters, linear character is shown.
Lower limit of stroke range
Analog input mA or 4-20 mA%
Lower limit of input range
Upper limit of input range

Figure12 Relationship between strokecalibration and analog input signal

⚠ **WARNING**
Any parameter change of "upper limit of analog quantity", "lower limit of analog quantity" and "positive and negative effect of signal" will affect the change of control characteristics. Please be careful.

➢ Analog input signal fault handling

Loss of control signal is a fault when analog input signal is used as the valve position setting signal source in the electric actuator. This part involves two parameters of "signal fault detection enablement" and "signal fault processing". Select "control signal" in the main menu, and set "signal fault detection enablement" and "signal fault processing" in the secondary menu.

"Signal fault detection enablement" has the option to allow or disable. When the "disable" item is selected, the detection and processing of analog input signal fault will not be carried out.

"Signal fault processing" has four options: keep the valve position unchanged, open the valve completely, close the valve completely, and pre-set the valve position; When the analog input signal fault occurs, the valve is driven for the corresponding protection action. When selecting "pre-set valve position", press "SET" to enter the modification menu of pre-set valve position value; press "EXIT" to return to the previous menu.

➢ Stop after self-check fault

This part involves five parameters: "handwheel", "valve position sensor fault", "running direction fault", "memory fault" and "valve stoppage fault".

In the case of shutdown, the electric actuator no longer performs its control functions, sets and displays the corresponding failure status. Once the fault causing the shutdown is resolved, it can only be restored to the normal working state by reloading the power supply.

(1) handwheel - when activated, once the mechanical handwheel exits, the actuator will stop working until the handwheel reset and return to normal.

(2) valve position sensor fault -- when activated, once the fault related to the valve position sensor occurs, the electric actuator will stop working.

(3) running direction failure -- when activated, the electric actuator will stop working once there is a fault related to the running direction.

(4) memory failure -- when activated, the electric actuator will stop working once a memory-related failure occurs.

(5) valve stoppage failure -- when activated, once the fault related to valve stoppage occurs, the electric actuator will stop working.

- **LCD display**

"Backlight time" -- the time that the background light of the actuator LCD screen continues to light up, which is always on when the value is 0; When the background light is off, press any key to relight it.

"Gray-scale adjustment" -- adjust the gray-scale of the LCD screen.

"Automatically lock the screen" – once the protection actuator is operated by an unrelated person, it will automatically start in remote mode. The lock screen time can be changed according to the need, and the lock screen function is cancelled when the time is 0. Note: lock screen function is not enabled in local mode.

"Permission password" -- a password can be set to lock the system menu, protect the executor from irrelevant operation, user can set permission password on their own, the password function is cancelled when the parameter is 0.

- RS485 communication

"Local address" - there cannot be duplicate machine addresses in the same bus network.

"Communication baud rate" -- the default is 9.6kbps.

- Language

Achieve the Chinese menu and English menu switch to meet the needs of users in different areas.

8、Debugging and calibration

8.1 "remote-local" operation method

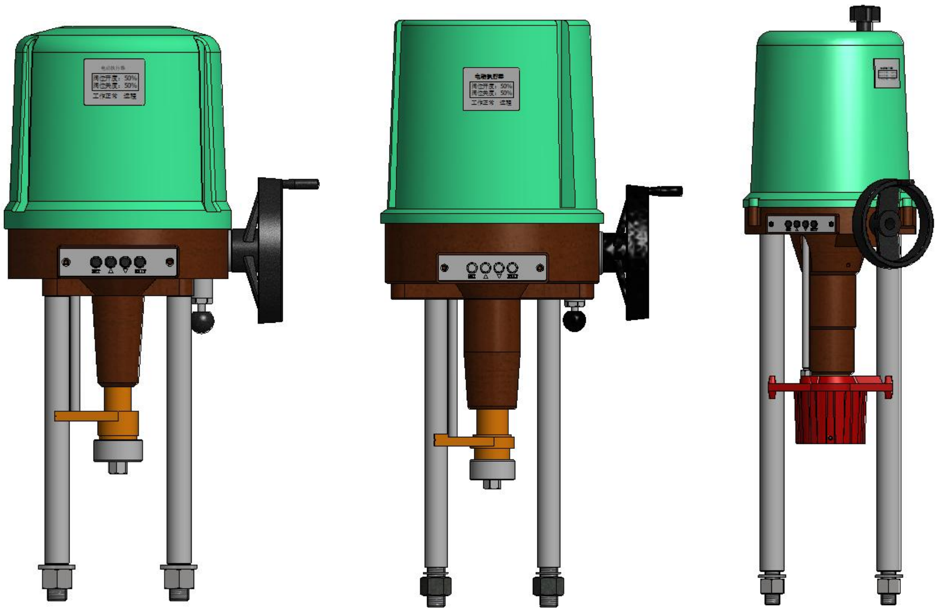
In order to ensure safe operation of the actuator, when the power supply or signal is lost, manual operation can be carried out without interrupting the adjustment process. Turn the handwheel in the clockwise direction to make the valve stem upward, while turn the handwheel in the counterclockwise direction to make the valve stem downward. Closing or opening of the valve depends on the setting of the "electrically open" or "electrically close".

The operation method is shown in figure 13, in which the state is "automatic" position.When manual operation is required, there are three steps as follows:

Use the left hand to pull down the black spherical handle under the base of the actuator;

Pull out the handwheel rotating shaft by "rotating counterclockwise" to make the spherical handle reset. At this time, the handwheel rotating shaft will extend a distance, indicating that the hand operation is in place;

Rotate the hand wheel to make manual operation. When the handwheel is rotated clockwise, the valve stem is shifted downward; when the handwheel is rotated counterclockwise, the valve stem is shifted upward.



XSL202-204 **XSL208-210** **XSL300-325**

Figure13 Appearance of handwheel operating mechanism of actuator

8.2 Automatic stroke check

⚠ **WARNING**

Do not use the automatic calibration function if the correct stroke limit switch is not set. Otherwise, the actuator or valve may be damaged. In case of serious injury, the equipment personnel may be harmed when serious.

Select "valve position check" in the main menu, and select "automatic stroke check" in the secondary menu to make automatic check directly, after entering the menu, it will run automatically and finally give the result of verification.If the calibration cannot be completed, please check reasons like valve position sensor, limit switch or shortage of valve stroke.

8.3 Manual stroke check

⚠ **CAUTION**

In the case that the correct stroke limit switch is not set, the use of manual calibration function may damage the actuator or valve!

Select "valve position check "in the main menu, select "manual stroke check" in the secondary menu to complete the stroke calibration according to the prompts on the screen. The main processes are:

(1) security prompt, press "SET" to continue the verification, press "EXIT" to terminate the verification and return to the previous menu;

(2) change the position of the valve through the "▼" or "▲" key, when find the lowest point of the valve (actuator) position, press the "SET" key to confirm and continue the next step of calibration;

(3) change the position of the valve through the "▼" or "▲" key, when find the highest point of the valve (actuator) position, press the "SET" key to confirm and continue to the next step;

(4) check given results.

If the calibration cannot be completed, please check reasons like valve position sensor, limit switch or shortage of valve stroke.

9、 Maintenance, breakdown and others

9.1 maintenance and regular inspection

1. Lubricating oil: due to the full application of EP lubricating oil, it is not necessary to inject lubricating oil in normal operation. However, for the very dry applications with humidity of less than 15% and hot applications with high temperatures above 30 degrees, please inform the manufacturer that the manufacturer will supply the lube nozzle (option).

In the above case, please inject appropriate amount of lubricating oil (EP type lubricating oil) into 2 nozzles once every 2 years.

2. Regular trial operation: when the valve/baffle and actuator are not in use for one month or longer, it is better to supply power all the time, and make regular trial operation about once a week.

3. Regular maintenance: regular inspection and maintenance is necessary for the long-term normal use of the actuator. Comprehensive inspection shall be made about once a year (operation state, corrosion, coating abnormality, etc.), if there is any abnormality, repair it immediately.

9.2 Simple breakdown and repair

Problems	**Reasons**	**Measures**
The actuator does not act	Whether the handwheel is reset	Reset the handwheel
	Disconnection of power	Open the power
	Low voltage	Confirm the power
	Motor power is different from supply power	Confirm the power supply and power supply on the nameplate
	Wiring is different from electrical drawings	Rewire according to electrical drawings

	A missing terminal or wire	Connect missed terminals or wires
	Input signal error	Check the input signal

1.Control signal fault:

Use one wire to connect the positive input and positive output terminals on the control panel, and another wire to connect the negative input and negative output terminals on the control panel. Check the menu to see if "set location" and "current location" correspond, if so! Check whether the control signal source is normal.

2.Position protection:

See if there is a value on current location, if so, reset the actuator. See page 21 for setting methods of product debugging.

3.The actuator is not turned on or off properly:

Check whether the handwheel is reset or not, if it is normal, check whether "remote state" is displayed on the LCD screen.

If it is normal, press the exit key to the "local" state, press the "up" key and "down" key on the panel respectively to check whether the actuator moves normally. If not, check whether each line is loose or falling off, especially the line on the limit switch.

If normal, check whether there is any foreign body inside the valve body to hold the valve core so that it cannot be closed, generally welding slag or something. And the valve can work normally after cleaning.

After completing the above steps, please re-check the valve position automatically.(refer to 8.6 and 8.7 stroke calibration)

4. Running direction fault

Check whether the capacitance of the motor gets smaller;

Restart the system after power failure, and then reset it automatically.

Notes:

1. The above table is for reference only and does not bear any responsibility;

2. Please consult the valve manufacturer for temperature and fluid characteristics in detail before selecting the valve;

3. For applications under special conditions such as high temperature, low temperature, seawater, severe corrosive conditions and high vibration, please consult our technical department before selecting the actuator;

4. Our company assumes no responsibility for users' decision ignoring our advice.

5. The content of the record will be changed without notice, please understand. For further information, please contact us. Although the actuator has been through strict quality control, manufacturing, production and transportation, but in case of any abnormal or unexpected situation, please inform the company's business operators and technical services department!