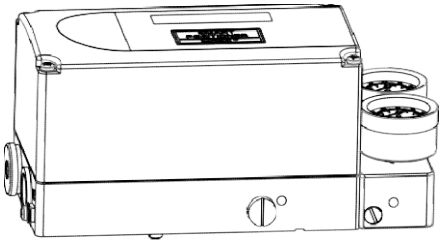
Pneutork

Smart Positioner

MSP-25 Series

USER'S MANUAL



PNEUTORK VALVE AUTOMATION

V 1.0.2

Pneutork

Summary of Specification

Thank you for using our products.Our products are manufactured and inspected in accordance with strict quality control regulations.

For more accurate and effective use of this product, please be sure to read this manual carefully before installation or use.

This manual must be sent to the end user.

◇ The contents of this manual can be changed without prior notice.

◇ The contents of this manual shall not be altered or replaced without our consent.

◇ If there is any problems which is not specified in this instruction, please contact us.

◇ The parameters specified in this manual are applicable to the specified model and conditions of use, and may not meet special conditions.

◇ This description is variable when the parameters, construction, components, etc. of the product changes.

Safety Precautions and Product Warranty Contents and Warranty Period

◇ For the safety of personnel, products and systems, the installation of this product must comply with the safety instructions specified in this manual.
MORC cannot guarantee its safety if it does not comply with the safety instructions listed in this manual.

◇ MORC will not compensate any personal injury or material loss caused by users' incorrect use of this product.

◇ In principle, the product warranty period shall be subject to the product warranty period specified in the quotation.

◇ During the warranty period, our company will charge for maintenance due to the following problems:

- Problems arising when a user arbitrarily disintegrates the product or fails to properly maintain it.
- Problems arising from improper transportation and custody.
- Problems arising from the use of exceed rated product parameters.
- Problems caused by improper installation.
- Problems caused by natural and man-made disasters such as fire, earthquake, storm, flood, thunder and lightning, and other natural disasters or insurrections, wars, radiations, etc.

Electrical Safety Instructions

MSP-25 is required to be operated by skilled professionals during the installation of electrical and pneumatic connections and debugging.

◇ Ensure to work within all electrical safety standards.

◇ When installing electrical wiring, please follow the "power connection" requirement on page 11.

◇ The electrical installation of protective equipment shall comply with all regulations and standards, especially the regulations on explosion protection.

◇ The safety instructions of pneumatic actuator should be followed when installing and debugging the equipment, especially pay attention to the possible risk of injury when there is high pressure in the actuator.

Operator Requirements

Only those who are familiar with the installation, debugging and maintenance of the positioner or similar equipment can operate the positioner, such as:

◇ Professional who is familiar with process automation safety regulations.

◇ Experienced debugging and maintenance personnel who are trained to install, debug, repair and maintain valve positioners or similar equipment.

◇ Personnel who is familiar with the operation of automatic control equipment and understand the specific content of operation instructions.

Product Introduction

MSP-25 series smart valve positioner is a control device which controls the valve opening degree through driving pneumatic actuator in response to an input signal of 4~20mA from controller or control system. Mainly used for controling valve position of pneumatic linear or rotary valve.

Product Features

◇ Adopting the advanced IP moudle, it has a unique air path structure, which can effectively reduce the influence of air source quality on piezoelectric valve.
◇ Easy to install and calibrate.
◇ Almost zero air source consumption when the valve position is stable.
◇ The same type of positioner can be applied to linear or rotary actuators.
◇ Modular design, less moving parts, easy to maintain.
◇ With LCD backlight display and button operation, simple operation can achieve a variety of functions.
◇ Can achieve automatic diagnosis of valve and actuator.
◇ Can achieve automatic zero adjustment function through a key.
◇ Can realize the position preserving function under power cut, air cut and signal cut.

Parameters

Item / Model	MSP-25L	MSP-25R
Input Signal	4~20mADC(or Split control: 20~100%)	
Input Pressure	0.14~0.7MPa	
Stroke	10~150mm	0~110°
Impendance	Max.450 Ω (Without HART)/Max.500 Ω (with HART)	
Air connection	NPT1/4 or G1/4	
Gauge connection	NPT1/8	
Conduit	2-G1/2, 2-NPT1/2 or 2-M20*1.5	
Ambient. Temp.	-20~80℃	
Repeatability	±.5%F.S.	
Linearity	±0.5%F.S.	
Hysteresis	±0.5%F.S.	
Sensitivity	±0.5%F.S.	
Air consumption	Stable valve position condition<0.0006N^3m/h	
Characteristics	Linear, Quick open(25:1 or 50：1), EQ%(1:25 or 1：50)	
Case Material	Aluminum Alloy	
Enclosure	IP66	
Explosion proof	ExiaIICT6	
Weight	2.3kg	

Product Number

MSP-25 1 2 3 4 5 6 7 8 9 10 – □□□

1 Motion Type		L: Linear R: Rotary
2 Acting Type		S: Single D: Double
3 Explosion proof		n: Non-Explosion i: ExiaIICT6
4 Lever Type	Linear	1: 10~40mm(Standard Type) 2: 20~100mm(Standard Type) 3: 90~150mm(Standard Type) 4: 5~35mm(Adaptor Type) 5: 40~130mm(Adaptor Type)
	Rotary	6: NAMUR
5 Power Connection		1: G1/2 2: NPT1/2 3: M20*1.5
6 Air port Connection		1: NPT1/4 2: G1/4
7 Communication		0: None 1: HART
8 Feedback Option		0: None 1: PTM 2: L/S 3: PTM+L/S
9 Disconnect Signal Type		E: Fail Exhaust H: Fail Hold
10 Additional Option (can choose both)		1: Gauge 2. Mounting Bracket

Remarks: 1. The default air port connection is NPT1/4. And other connection type is optional, please confirm when ordering.
2. Limit switch is a two-wire active contact. If need other switch requirements, please confirm when ordering.
3. □□□is special order code.

Structure

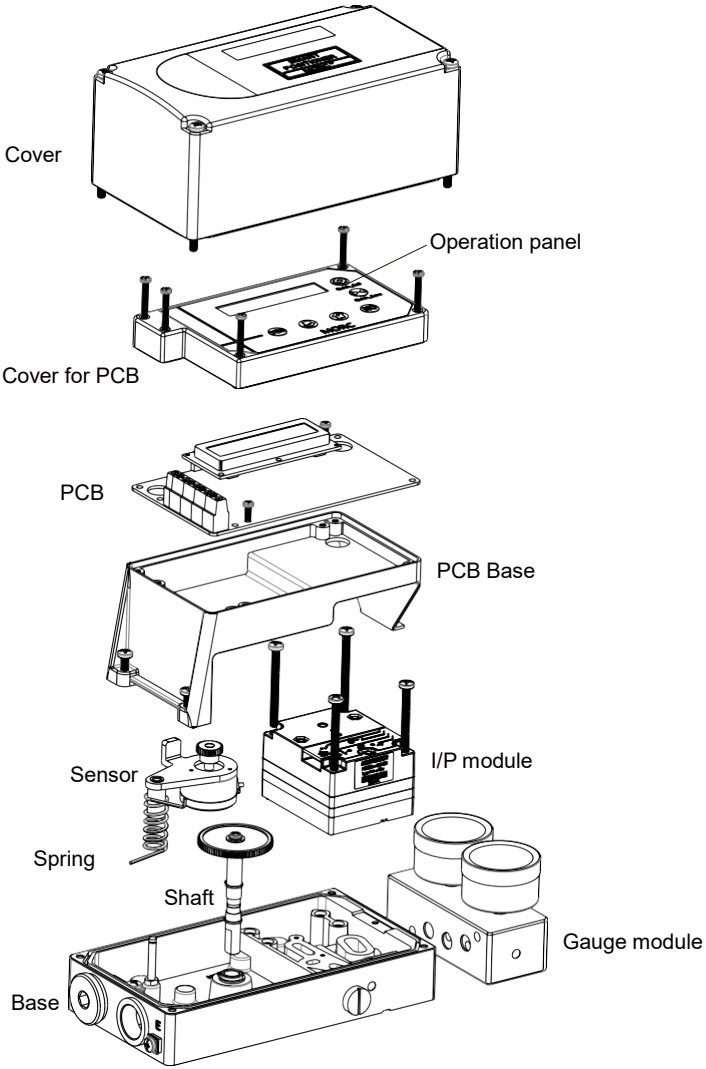


Fig.1 Structure

Principle

MSP-25 smart valve positioner receives 4~20mA DC input signal from the control system or controller(Set value), comparing with the current valve position feedback value after A/D conversion, then according to the difference value , the microprocessor (CPU) output corresponding electrical impulse signal to the I/P module. The air pressure and air flow volume enters to the actuator is adjusted by I/P module , and make the valve position change. Valve position sensor detects valve position change, and feedback to CPU. When the difference value between set value and feedback value is 0, the I/P module closes the air channel output to the actuator, and the valve position keeps stable until the difference occurs again.

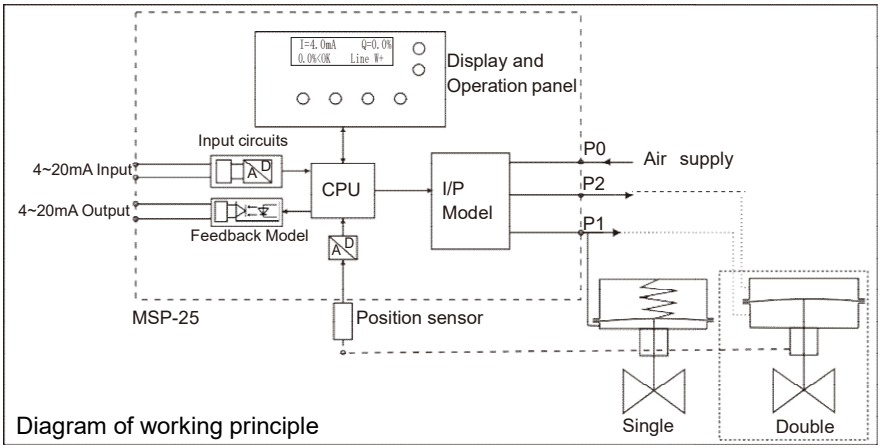


Diagram of working principle

Outline Dimension

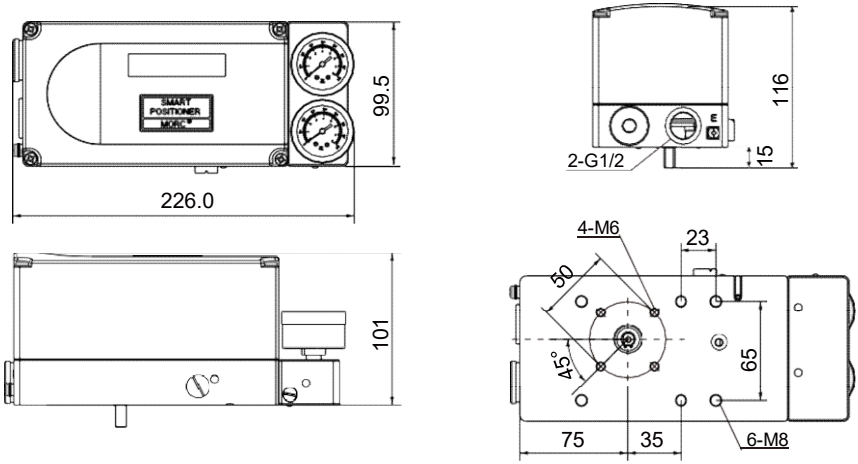


Fig.2 Outline Dimension

Installation and Calibration Attention

Please comply with the following matters when installing this product on the actuator.

◇ All input signal and air source signal of valve, actuator and other accessories must be completely cut off before installation.

◇ In order to prevent system shutdown, the control valve should be separated into a completely independent state by a bypass valve or similar device.

◇ Pressure shall not be maintained inside the actuator.

MSP-25L Installation

Install MSP-25L with mounting bracket

1. Make a mounting bracket for the positioner that can be properly connected to the actuator bracket.

Note: it is required that the rotation angle of the lever within the stroke of the valve is adjustable within the permissible angle range when making the bracket.

2 . Using fixed bolts to connect the mounting bracket and MSP-25L, installation diagram is shown below. The standard bolt specification for fixing the positioner is M8* 1.25P.

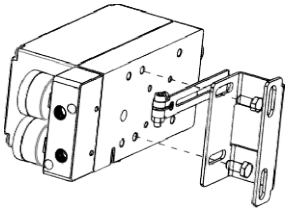


Fig.3 Mounting bracket

3. After fixed the bracket and positioner, do not tighten the bolts completely before connecting to the actuator, and leave a certain gap for later adjustment.

4. Install the connecting rod on the feedback lever of MSP-25L when connecting valve stem and actuator push rod. The height of the groove on the feedback lever of MSP-25L is 6.5mm, so the diameter size of the connecting rod should be less than 6.3mm.

5. Insert the connecting rod mounted on the stem connector into the groove of the feedback lever. As shown above, the connection rod should be inserted into the fixed spring on the feedback lever to reduce the lag.

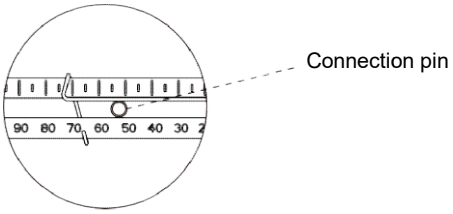


Fig.4 Position of the connection pin

6. The actuator is separately connected with the air source tube, and the pressure is adjusted through the air filter regulator to open the valve to 50% position, and the position of the positioner is adjusted up and down to make the feedback lever in the horizontal state (the feedback lever is vertical to the valve stem), and then tighten the fixation bolts.

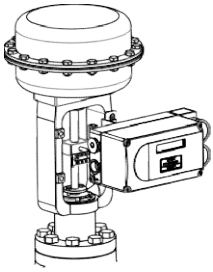


Fig.5 Assembly Effect Diagram

No piping installation of MSP-25L

MSP-25 can be used on linear stroke actuators without piping connections.

1. As shown below, first, the non-tube plug on the back of MSP-25 product should be unscrewed with a cross screwdriver. And should bolck the air outlet 1 (P1) with a 1/4" plug.

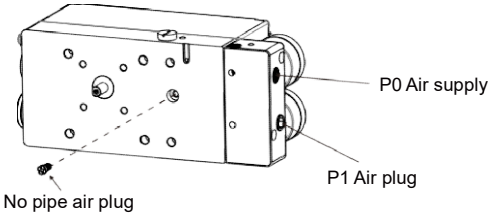


Fig.6 No pipe air port diagram

2. As shown in the figure below, MSP-25 is fixed on a pipe-free actuator with 2 screws. At this point, please note that the o-ring on the actuator bracket falls off, and make sure that the feedback lever is properly connected to the actuator shaft.

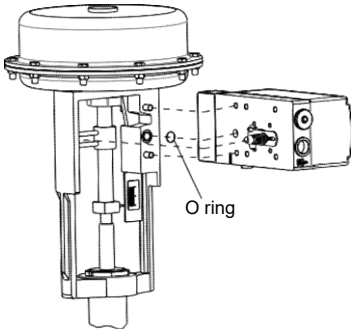


Fig.7 No pipe install diagram

MSP-25R Installation

MSP-25R should be installed on rotary motion valve such as ball or butterfly type which uses rack and pinion, scotch yoke or other type of actuators which stem rotates 90 degrees.

Install MSP-25R with mounting bracket

The MSP-25 is equipped with standard mounting bracket and NAMUR connecting shaft. Installation steps of Angle stroke are as follows:

1. Fix the connecting shaft to the positioner main shaft, and pay attention to the notch direction of the positioner main shaft when assembling.

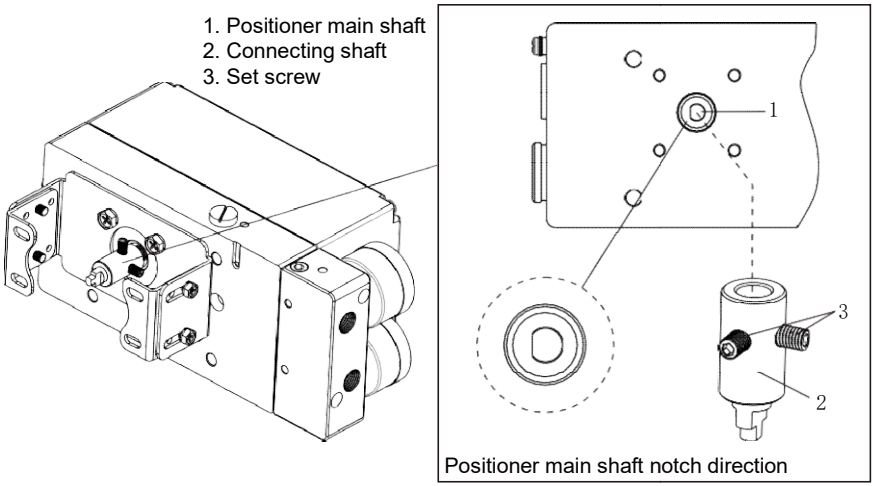


Fig.8 Connect the connecting shaft

The mounting bracket and connecting shaft of MSP-25 comply with NAMUR connection standard, and can be adjusted according to the height of the main shaft of the actuator. The bracket is applicable to the size standard of the actuator spindle height of 20mm and 30mm (as shown in figure 9).

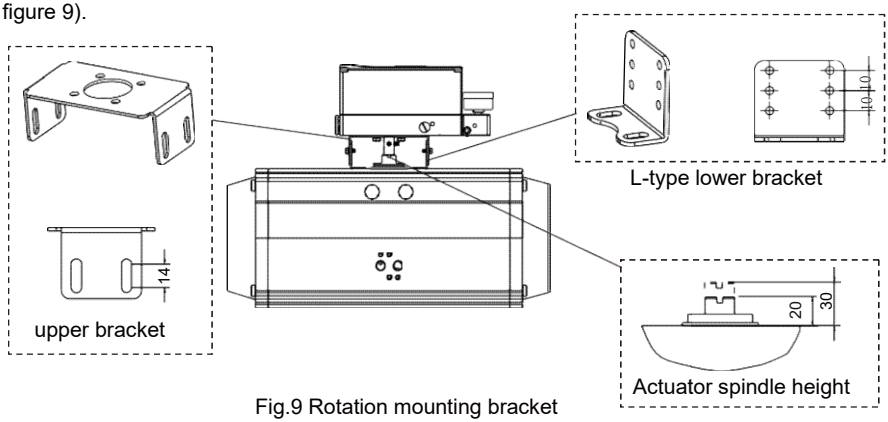


Fig.9 Rotation mounting bracket

2. Fix the bracket on the positioner and the actuator.
(1) Fix the upper bracket of the adjustable bracket on the positioner with M6 screws.
(2) Fix the left and right L-shaped brackets on the upper bracket, screw up the screws, but do not tighten them first.
(3) Insert the connecting shaft into the long groove of the actuator spindle, adjust the bracket height, and tighten the fixing screw.
(4) Use M5 screws to fix the positioner bracket to the actuator.

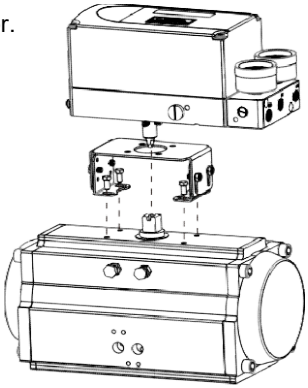


Fig.10 MSP-25 Install on the actuator

Variable orifice

MSP-25 provides variable orifice, can adjust the flow rate of output air. Factory default is mediate flow rate, the user can adjust the flow rate according to the actuator needs.

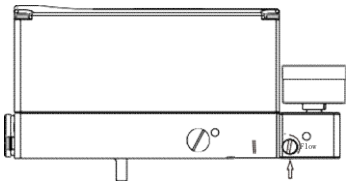
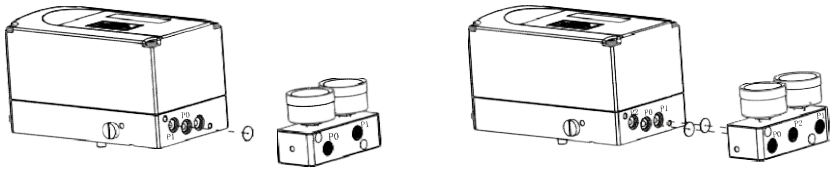


Fig.11 Variable orifice

Install the Orifice

If the size of actuator is too small relative to the flow rate, positioner can have hunting. In order to avoid hunting, orifice can be used. There are three types of the orifice.
MSP-25 randomly standard with φ1.3mm orifice, the user can be installed as needed.



Single acting Double acting

Fig.12 Install the orifice

Air Pipe Connection

Note:

1. In order to prevent water, oil and other things from being mixed into the air compressor and air pressure system, please select the filtration equipment correctly.
2. Air source connection of MSP-25 series products must be installed in front of the filter or air filter regulator with a filter to prevent the infiltration of water, oil and other things.

Supply Pressure Condition

1. The air pressure used must conform to ISO8573-1:2001 compressed air quality level 4:
   (1) Filter grade 4 (filtering accuracy: 15um).
   (2) Total oil content (including oil and gas) shall not exceed 25mg /m^3 within 24 hours.
   (3) The pressure dew point (water content) is lower than 3 ℃.
2. Air supply pressure range: 1.4~7 bar.

Pipe connection conditions

1. Remove foreign matter from inside the pipe before connecting the pipe.
2. The air pipe cannot be compressed out of shape or ruptured.

⚠ Warning

Installation and calibration should comply with the safety regulations of pneumatic actuator, before connecting the air source, should carefully check whether it meets the regulated requirements, whether the torque force generated by the actuator is dangerous to personal injury.

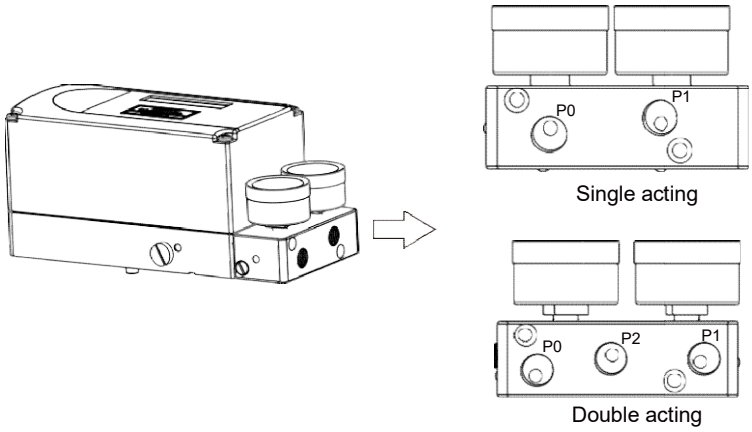


Fig.13 Air port

The Pipe Connection between actuator and MSP-25

MSP-25 single-acting positioner has two air ports, P0 for the air supply and P1 for the outlet, suitable for the single-acting actuator. Double-acting type has three air ports, P0 is the air supply, P1 and P2 are the outlet port, P1 port has no air pressure output when there is no electrical signal, and P2 port has air pressure output, suitable for the double-acting actuator(FIG. 13 is the air port diagram).

The default air connect standard is NPT1/4, and the user shall configure the appropriate air pipe joint and air pipe by himself.

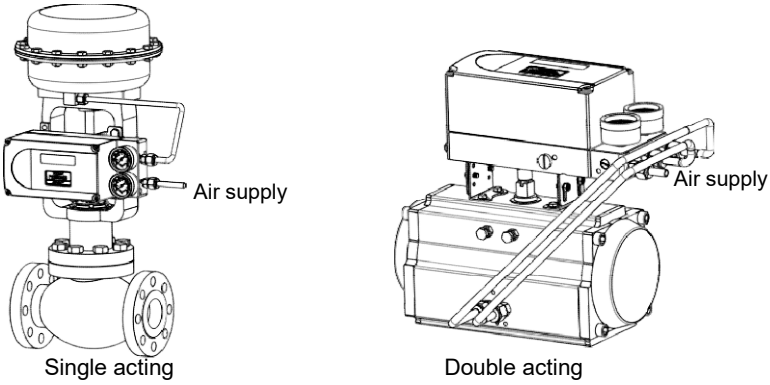


Fig.14 The pipe connection between actuator and MSP-25

Power Connection

⚠Warning

The installation process shall comply with the general electrical safety procedures, and the operation shall comply with the safety operation procedures for the installation and operation of electrical equipment. Attention should be paid to comply with the relevant explosion-proof regulations in the process of operation and installation. Intrinsically safe positioner input and output signals must be added to the security gate.

When directly connecting the 24VDC power supply, please strictly follow the provisions of this manual to avoid connecting it into the signal circuit (especially when installing the positioner with PTM function), otherwise it may damage the circuit motherboard.

Note

1. Please confirm whether the power supply has been cut off before connecting the terminals.
2. Circular joints are recommended for impact and stretch.
3. MSP-25 is a two-wire system,4~20mA is both a control signal and a power supply.
4. MSP-25 with PTM output must be supplied with a separate DC power supply, the standard configuration is 24VDC, the supply voltage can not exceed 36V.
5. For the safety of the product, the wiring circuit must be reliably grounded.
6. Please do not install cables near high-capacity motors and other products to avoid signal interference that may cause abnormal or damaged to the positioner.

Cable Entry

MSP-25 has two cable inlet, one is connected seal connector, and the other is blocked with a silk and reserved for spare (as shown in figure 15). The default cable entry standard is G1/2, and the user shall configure the appropriate cable connector.

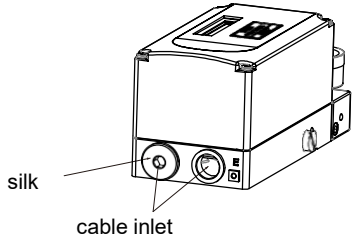


Fig.15 cable entry

Wiring Terminal Diagram

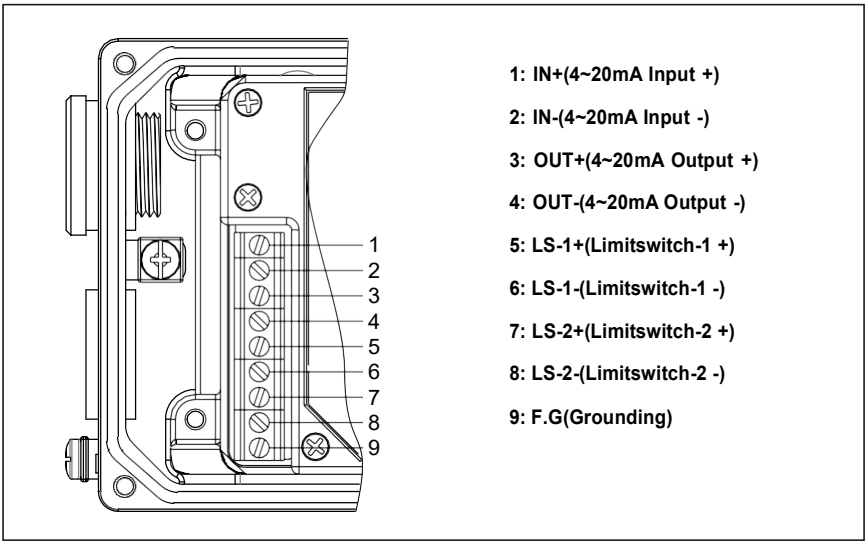


Fig.16 Wiring Terminal Diagram

Wiring Diagram

Terminal connection of input signal and feedback output signal

The input signal is a two-wire 4~20mA current source signal, and the minimum maintenance current is 3.5mA, no additional power supply is needed. When the positioner has 4~20mA feedback signal output, the feedback loop needs power supply.

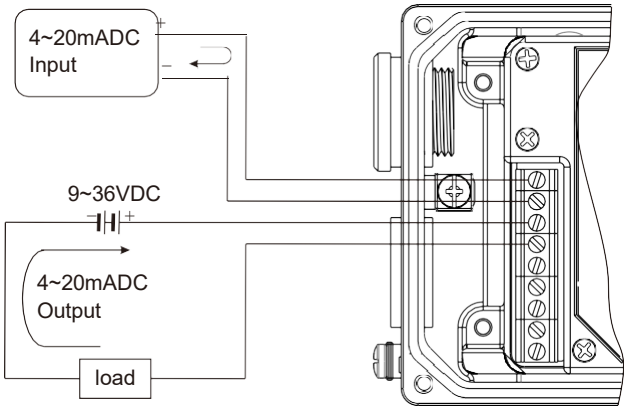


Fig.17 Input and Output signal connecting

Terminal connection of limit switches

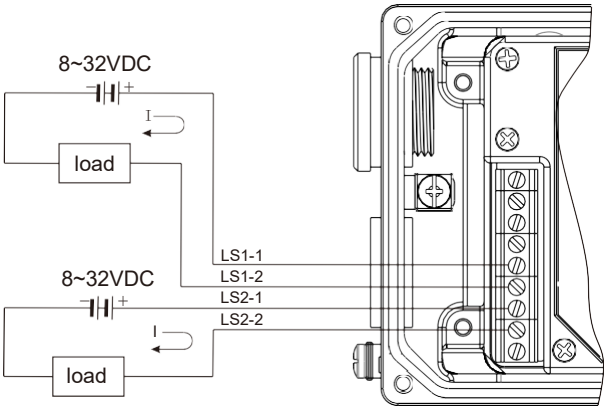


Fig.18 Limit switches connecting

Two wire limit switches

While Vi=24V, OFF: I≤1.2mA, ON: I≥2.1mA

Note:The limit switch signal is an active two-wire switch output, the circuit needs to be equipped with a power supply, at the same time, there must be a normal input signal in the normal operation, the limit switch has the normal output.

Display

Note

MSP - 25 LCD working temperature is 25℃ ~ 85 ℃, storage temperature is -30℃~ 85 ℃.If the ambient temperature exceeds this range, the display will appear abnormal.

LCD display content

MSP-25 input current signal, LCD display welcome screen "Welcome to MORC" about 2 seconds, then automatically enter the normal display mode.

1. Normal operating mode

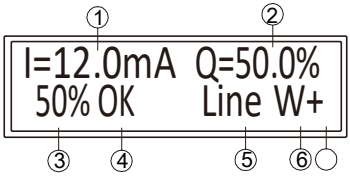
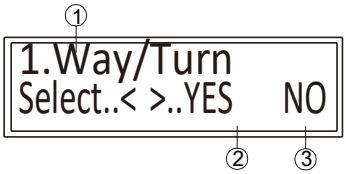


Fig.19 LCD display panel

① Current input current value
② Theoretical valve position value
③ Actual valve position value, when no debugging, the display value is a random value; If debugged, it will show the valve position value corresponding to the current signal.
④ Error between actual valve position and theoretical valve position, when the error is within the allowable range, "OK" is displayed.
⑤ Flow characteristics: Line is linear
⑥ Stroke: W(WAY) is linear stroke, T(TURN) is rorary stroke.
⑦ Valve air control direction: "+" is the air opening valve, "-" is the air closing valve.

2. Parameter Mode



① Menu options or parameter values
② YES: Save/Confirm
③ NO: Not Save/Return

Key definition

NOTE

Operating the positioner may cause movement of the valve and actuator, so before operation, be sure whether the operation is allowed, or the valve must be isolated from the whole system before operation to ensure the safety of the whole system.

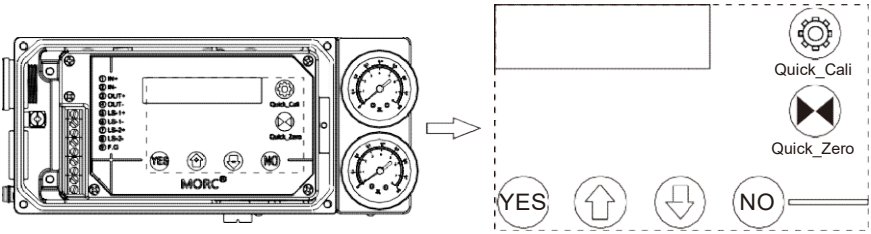


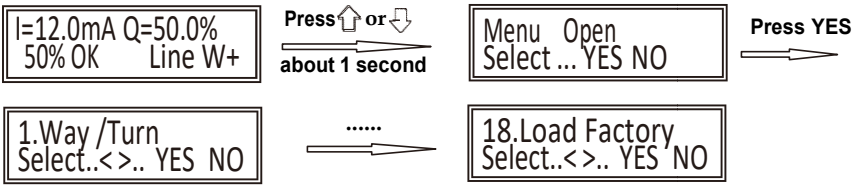
Fig.20 Key panel

Key definition

Key	Definition
YES	Confirm button; Press this key in working mode to display error parameters.
⇧	Menu Entry button; Menu to scroll up or add value.
⇩	Menu Entry button; Menu to scroll down or reduce value.
NO	Deselect or discard a modified value and return or exit.
Quick_Cali	Quick calibration button, enter the calibrate selection menu when pressed.
Quick_Zero	Quick zero point calibration, automatically calibrate zero when zero is not correct.

Enter Configuration Parameters

In normal operating mode, press ⇧ or ⇩ for about one second to enter the configuration parameter mode. All parameters are displayed sequentially and can be looped by pressing the arrow key.



Configuration Parameters and Their Function

1. Way/Turn

Valve motion type , Way is Linear, Turn is Rotary.

2.Sensor Angle

Sensor Angle setting, which is starting angle of the zero point, can be set by toggle potentiometer gear setting (see page P20).

Once the sensor angle is changed, the positioner must be re-calibrated.

3.Auto Calibrate

Automatic calibration mode. After execution, zero point, end point, stroke direction and parameter optimization will be automatically detected.

4.M-Calibrate

Manual calibration mode. After execution, valve zero point, middle point and terminal position shall be set manually, and then parameter optimization shall be carried out automatically.

5.Manual Operate

Manual operation switch can directly control valve to close or open by pressing the arrow key.

6.Sensitivity

Sensitivity setting, automatic detection when calibrating automatically, the range can be set manually by default : AUTO, 0.4%~1.6%.

7.Linear Correct

Linear correction, eliminate the linear error caused by feedback lever, can be set range: -3~+3.

8.SDIR_Setpoint

Control valve position direction (direct acting/reverse acting), Rise: rises with the signal direction, Fall: falls with the signal direction.

9.YDIR_Display

Valve position display direction, Rise: rises with the signal direction, Fall: falls with the signal direction.

10. Flow Curve

Flow characteristics, the relationship between input signal and valve position, the default is linear , can choose the following characteristic curve:

Free: user-defined flow curve

1:25 equal percent flow curve

1:33 equal percent flow curve

1:50 equal percent flow curve

25:1 quick open flow curve

33:1 quick open flow curve

50:1 quick open flow curve

Hart settings from Hart HCONDIG, by Hart Configuration

11.YCLS(T_Close)

Tight close setting, set value beyond the tight close value range, positioner will be fully charged or fully exhaust to ensure that the valve is opened or closed reliably.

YCLS=DOWN: Low side close

UP: High side close

DOWN / UP: Low/ High side close

OFF: Close the tight close function

12.YCDO/YCUP

Close valve value setting, range: 0~100%. The factory default value is YCDO(DOWN)=2% and YCUP=98%.

13.Range Split

Split control settings. The range of starting and ending points can be set: 0~100%, and the factory default value is SPRA(Start)=0% and SPRE(END)=100%.

14.Feedback_DIR

Valve position feedback signal direction.4~20mA or 20~4mA can be set, and the factory default is 4~20mA.

15.Limit Switch

Limit switch output setting. SW1 is the low switch, SW2 is the high switch.

16.ShowHelpInfo

Display help information. Display software version, technical support information.

17.Single/Double

Single acting/double acting Settings. Single: Single acting, Double: Double acting.

18.Load Factory

Recover factory setting.

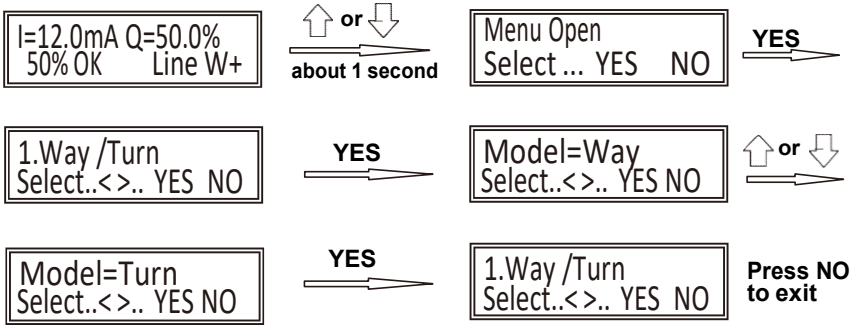
Calibration

MSP-25 provides automatic/manual calibration mode, and the following preparations should be made before debugging:

1. Install MSP-25 as required.
2. Supply the air source and determine that the air pressure value that can drive the valve to full open of close.
3. Input any current signal in the range of 4~20mADC to ensure that the positioner can display normally.
4. Set the motion type(Way/Turn) of valve and Sensor Angle of the positioner.
5. Automatic calibration mode or manual calibration mode can be selected for valves with stroke limited. For valves with no stroke limited (especially linear valves), manual calibration mode is preferred.

Set Motion type of Positioner

The motion types of MSP-25 include linear-acting (Way) and rotary-acting (Turn). Before calibrate, we need to go to the parameter mode menu to select the motion type.
Method of setting up:



Setting Sensor Angle

◇ Effective range of angular measurements for position sensors: 0~110°. Sensor angle can be rotated arbitrarily. The position sensor angle direction is shown in Figure 21.

- The clockwise rotation angle increases, and when the 110° is measured, the continuation of the rotation will return to the 0°.
- The counterclockwise rotation angle decreases, and when the 0° is measured, the continuation of the rotation will return to the 110°.
- Neither the linear acting valve nor the rotary acting valve shall exceed this range, and a gap of 5 °must be guaranteed at both ends so that the valve does not operate in the range of 0 °~ 5 °or 105 °~ 110 °. (see P29 Table for sensor angle settings)

◇ Rotary valve: angle range is 0 ~ 90 °, sensor angle range from zero to full range must be controlled within 5 ~ 105 °.

◇ Linear valve: minimum angle is 20 °, maximum 100 °, the valve position is required to be 50% position of the feedback rod in the horizontal direction. Valve zero full range angle range must be controlled within 5 ~ 105 °, and angle range as far as possible in the middle range.

Note: when the sensor angle range is abnormal, the positioner will not work or act abnormatly, need to adjust the angle range.

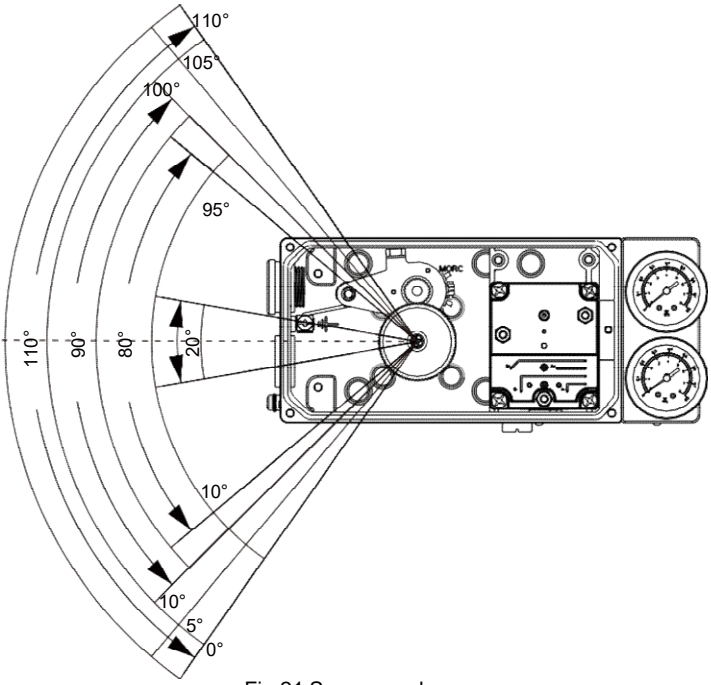
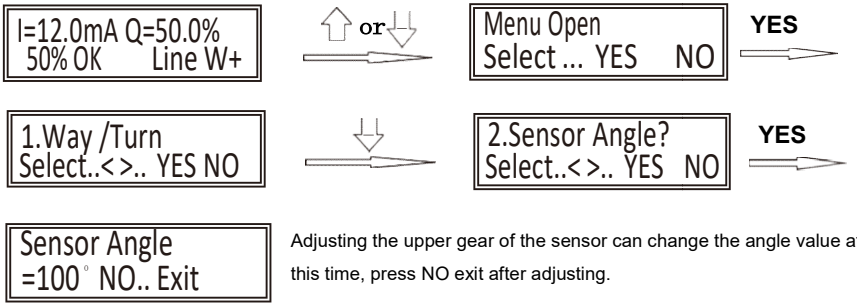


Fig.21 Sensor angle range

Sensor Angle Adjustment Method

When the sensor angle is not within normal range, need to adjust the sensor angle range. The angle of the sensor is adjusted by viewing the sensor angle parameter (Sensor Angle) and rotating the gear of the sensor. The methods are as follows:



Adjusting the upper gear of the sensor can change the angle value at this time, press NO exit after adjusting.

(Note: the example value of 100 ° is shown here, please adjust as needed)

Sensor Angle Setting Methods

1. Pull the sensor out by hand to make the sensor's shaft gear and positioner's main shaft gear staggered a certain gap.
2. Rotating sensor gear (clockwise or counterclockwise), observe the angle change on the display screen, rotate the gear to change the angle to the desired angle value.

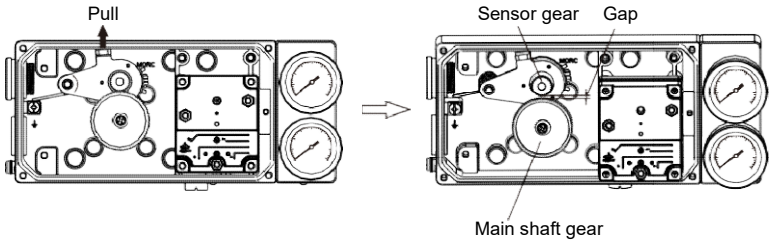


Fig.22 Sensor angle setting methods

3. After adjusting the sensor angle, the positioner must be recalibrated.

Note: Sensor Angle is the starting angle of the positioner, that is, the sensor angle at zero position. This angle is set according to the rotation direction and angle range of the feedback rod after installed on the valve. When the valve position moves from zero to full, the angle increases when the direction of rotation of the feedback rod is clockwise, and the starting angle is set to a smaller value; the direction of rotation of the feedback rod is counterclockwise, the angle decreases, and the starting angle is set to a larger value.

When the positioner detects that the feedback rod rotates clockwise, the direction of action is defined as DIR Direction=Rise.Conversely, counterclockwise is defined as DIR Direction=Fall.

Setting Principle:

For rotary acting valve, stroke angle is generally 90 °, if travel direction is rise, starting angle is set between 5 °and 10 °; if stroke direction is Fall, starting angle is set between 95 °and 100 °.

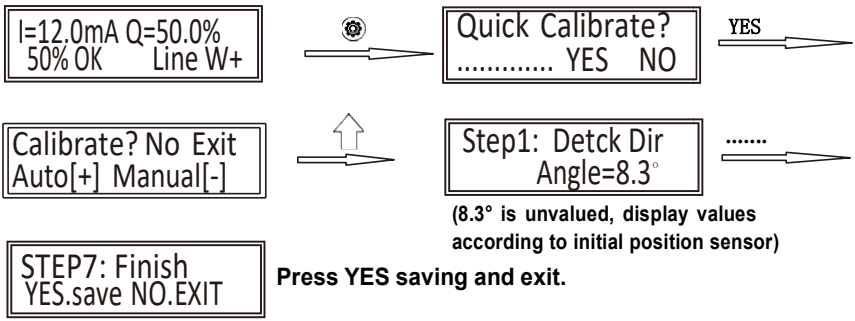
For linear acting valve, the allowable travel range is 20 °~100 °, and the conventional stroke angle should be about 50 °. When installing and adjusting the starting angle, the angle should be changed in the middle range of 20 ~ 100 °as far as possible. For example, when the stroke angle of the feedback rod is 50 °, the starting angle of the stroke direction is about 30 ° if the travel direction is Rise, and the starting angle is about 80 ° if the stroke direction is Fall.

Auto Calibration

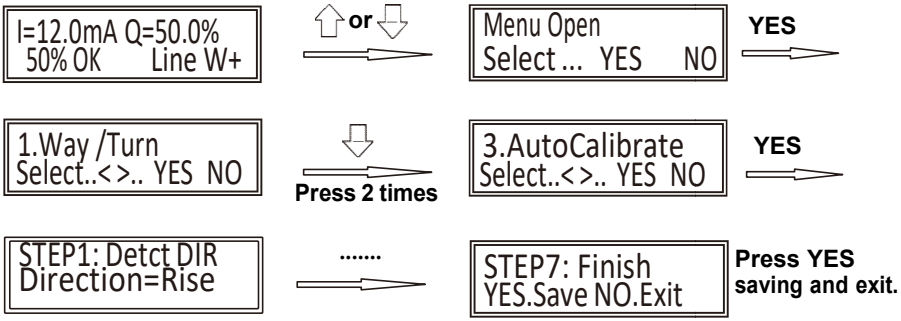
1. After the above steps are ready, start calibrating.

2. Press the quick calibration key( ) , use the direction key to select the automatic calibration mode, or enter the parameter menu to select the automatic calibration mode to start the following automatic calibration:

Quick calibration mode



Menu to select calibration mode



3. Automatic Calibration Process Description

There are 7 steps in the automatic calibration process, which takes about 2-3 minutes.

STEP1: Detct DIR: Detect and control the valve position direction

STEP2: DetctZero: Detect zero position

STEP3: DetctFull: Detect full position

STEP4: Exhaust: Detect exhaust time

STEP5: FullTime: Detect inflate time

STEP 5.1: Hi_UP :Stride up

STEP 5.2: Leakage: Detect leakage rate

STEP 5.3: Low_UP: Fine step up

STEP 5.4: Low_Down: Fine step down

STEP 5.5: Hi_Down: Stride down

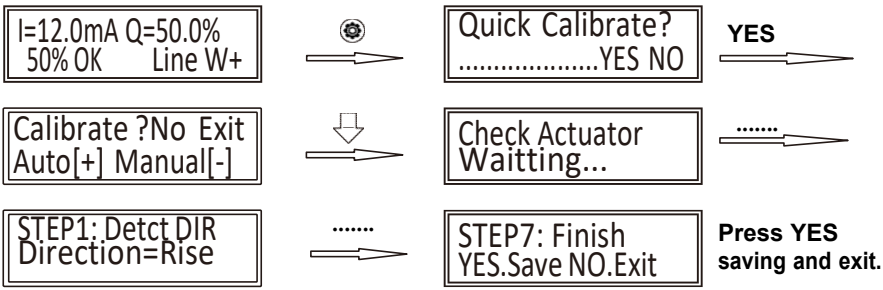
STEP 6: Detect 5-point error values of ascending and descending (0%-25%-50%-75%-100%)

STEP 7: Finish: Calibration complete, press YES to save and exit.

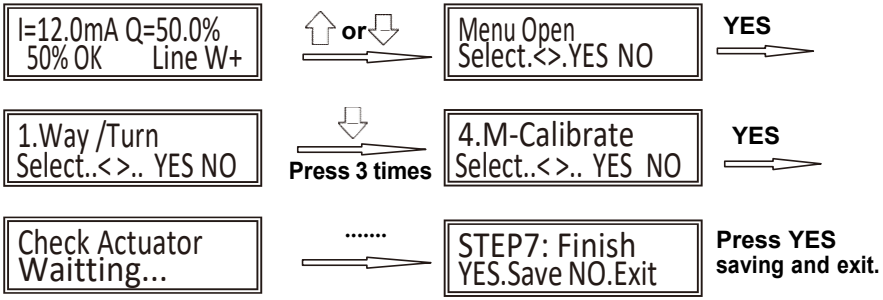
Manual Calibration

The difference between manual calibration and automatic calibration is mainly in the first three steps. Manual calibration will manually set the Angle of the actual valve zero point, the middle point and the end point. After completion, automatic calibration will be carried out in the following steps.

Quick calibration mode



Menu to select calibration mode



Manaul Calibration Process:

Check actuator control direction(Rising or Fall)

Detect that the current control direction is valve position rising with the signal.

Set the zero point Angle. Press the direction key to drive the valve to zero , press YES to confirm.

Set the middle point Angle. Press the direction key to drive the valve to the middle position, press YES to confirm.

Set the end point Angle. Press the direction key to drive the valve to the end position, press YES to confirm.

Detect exhaust time

(Refer to the automatic calibration process instructions for detail procedures)

Calibration is completed, press YES to save and exit.

Notes for calibration:

1. When the linear stroke valve is automatically calibrated, the positioner will automatically detect the limit position of the full open and full close of valve positions. When the maximum stroke of the stem (infinite position device) is greater than the actual stroke, the valve flow control will be inaccurate. At the same time, due to lack of stroke limit, improper installation may lead to the positioner feedback lever touching the actuator and unable to complete the journey, or even damage the feedback lever or actuator. Therefore, when this happens, use manual calibration mode to preset the actual stroke position.

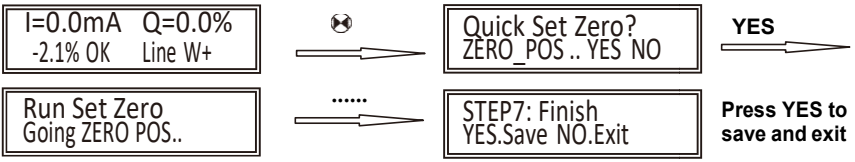
2. During automatic calibration, the air source pressure shall not exceed too much pressure required for valve opening/closing, and the maximum exceeds about 0.05mpa. Avoid stem jacking due to excessive pressure.

Error information and handling methods that may occur in the calibration process

SensorAngleError 5°<SetAngle>15°	The initial Angle of sensor need to adjust to 5 ° ~ 15 °
SensorAngleError 95°<SetAngle>105°	The sensor end Angle need to adjust to 95 ° ~ 105 °
Calibrate error TurnAngleMust>20°	Full stroke Angle of actuator must be more than 20 °
Calibrate fail Over time	Calibration time over the specified time: 600 seconds, need to check the air source and installation problems
Calibrate stop No complete	Calibration interrupted.
Pressure Air or Valve error	No compressed air or valve failure

Quick Zero Calibration

In the process of use, if the valve position drift occurs, the quick zero point calibration button can be used for zero point calibration. The method is as follows:



HART Digital Communication

MSP-25 series allows digital communication with HART, which can be communicated through EMERSON HART375 hand-operated devices.

Connection of HART375

The HART digital communication signal is superimposed on the 4~20mA input loop, and the connection method of HART375 is shown in figure 23.

Note: when there is a safety gate in the input loop, the HART375 must be connected to the back of the security gate, otherwise the HART signal will be absorbed by the security gate, resulting in the HART375 unable to communicate with MSP-25!

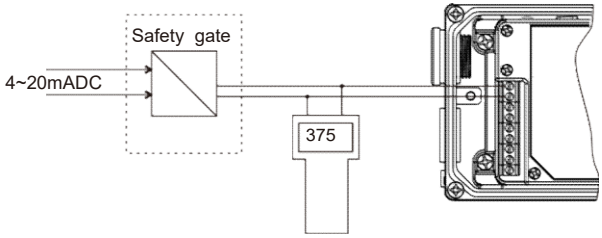
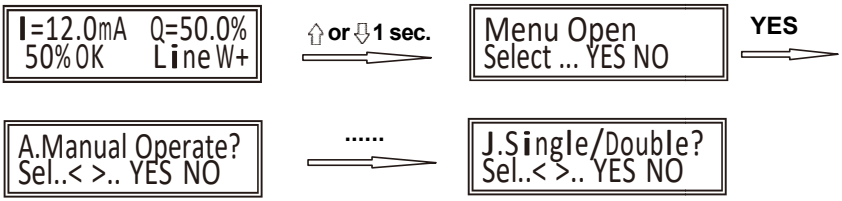


Fig.23 Connection of HART375

Configuration parameters of HART

The main board configuration parameters with HART function locator are different from those without HART function motherboard. The operation methods are as follows: in normal working mode, holding down ⇧ or ⇩ about 1 second, configuration parameter mode can be entered. All the parameters are displayed in sequence, and the arrow key can be displayed cyclically.



Configuration parameters and its function

A.Manual Operate

Manual operation switch can directly control valve to close or open by pressing the arrow key.

B.Sensor Angle

Sensor Angle setting ,which is starting angle of the zero point , can be set by toggle potentiometer gear setting (see page P20). Once the sensor angle is changed, the positioner must be re-calibrated.

C.SetParameters

HART configuration parameter settings, detailed configuration method see P26 page.

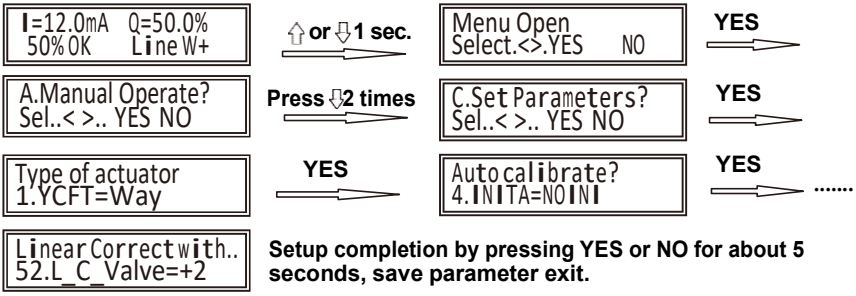
D.Auto Calibrate

Automatic calibration mode. After execution, zero point, end point, stroke direction and parameter optimization will be automatically detected.

E.M-Calibrate
Manual calibration mode. After execution, valve zero point, middle point and terminal position shall be set manually, and then parameter optimization shall be carried out automatically.
F.Feedback_DIR
Valve position feedback signal direction.4~20mA or 20~4mA can be set, and the factory default is 4~20mA.
G.Load Factory
Recover factory setting.
H.ShowHelpInfo
Displays help information. Display software version, technical support information.
I.HART Sys_Info
HART information, it is recommended to select the default setting.
J.Single/Double
Single acting/double acting Settings. Single: Single acting, Double: Double acting.

HART Configuration parameter setting method

Enter the HART configuration parameters menu, press YES or NO to flip menu items, press ⇧and⇩ modify parameter items or parameter values.



The specific HART configuration parameters are shown in Table 1.

Table 1: HART parameter configuration

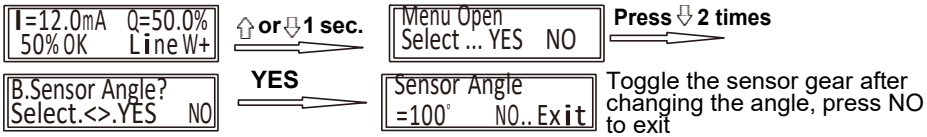
Name	Display and Function	Parameter Bold as factory default
1.YFCT	Type of actuator Type of actuator	**Way** **Linear** Turn Rotary
4. INITA	Auto calibrate Auto calibrate	**NOINI**/Start Long press "▲" automatic calibration
5.INITM	Manual calibrate Manual calibrate	**NOINI**/Start Long press "▲" automatic calibration
7.SDIR	Setpoint direction The direction of position while signal up	**Rise** **Rising** Fall Falling
8.SPRA	Setpoint for start of split range Zero-point of input signal	**0**, Configurable range:0-100%
9.SPRE	Setpoint for end of split range End-point of input signal	**100%**, Configurable range:0-100%

12.SFCT	Setpoint function Linear Linear Output characteristic EQ 1:25 1:33 1:50 QO 25:1 33:1 50:1 User Set Freely adjustable	**Linear** 1：25 1：33 1：50 INV 25:1 33:1 50:1 Free
13.SL0 14.SL1 33.SL20	Setpoint turning point at 0% User Setting 5% . . . 100%	0%~100% 5% . . . 100%
34.DEBA	Dead band of controller	**Auto**/1. 2% 0. 4~10. 0%
38.YDIR	Direction of manipulated variable for display and feedback	**Rise** Fall
39.YCLS	Tight closing with manipulated varialbe Without Top only Bottom only Top and Bottom	**OFF** Top Bottom Top&Bottom
40.YCDO	Valve for tight closing, bottom	0. . . **2**. . . 100%
41.YCUP	Valve for tight closing, top	0. . . **98**. . . 100%
44.AFCT	Alarm function NO: ON/OFF NO: A1=Min, A2=Max NO: A1=Min, A2=Mix NO: A1=Max, A2=Max NC: ON/OFF NC: A1=Min, A2=Max NC: A1=Min, A2=Mix NC: A1=Max, A2=Max	+/OFF NO **+/MinMax** NO +/MinMin NO +/MaxMax NO +/OFF NC +/MinMax NC +/MinMin NC +/MaxMax NC
45.A1	Response threshold of alarm A1	0. . . **10**. . . 100%
46.A2	Response threshold of alarm A2	0. . . **90**. . . 100%
50.PRST	Factory Setting	**NO**/Start Long press “▲” automatic calibration
52.L_C-Valve	Linear Correct with sine Curve: +3% to -3%	+3%...**+2**%...-3%

Other parameter menu setting method

Set the sensor angle

The sensor setting method of the positioner is detailed in page 18~20.

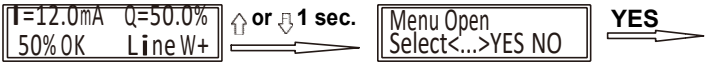


Note: once the sensor angle is adjusted, the locator must be recalibrated.

Auto/Manual Calibration

Calibration method is the same as common type(Without HART), and detail setting in page 21~24.

Manual Operation

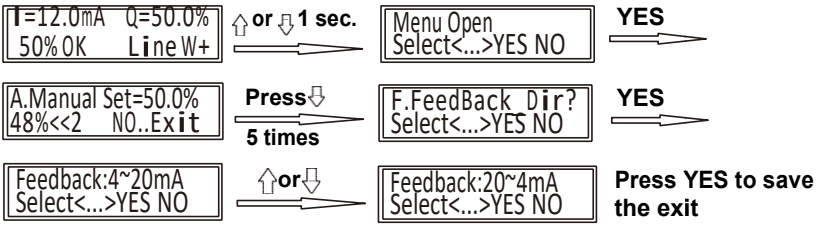


Press or change the set value to control valve opening or closing, press NO exit.

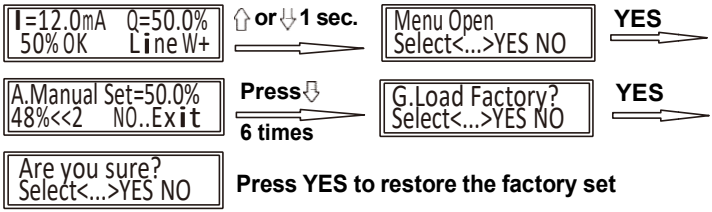
Note: manual state without any operation, will not automatically return to the normal state, unless press NO key or power off.

Setting Normal / Reverse Feedback Signal

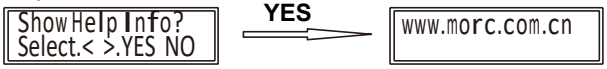
When the positioner has 4~20mA valve position feedback function, its feedback output can be set in normal / reverse direction.



Factory Setting



Help information

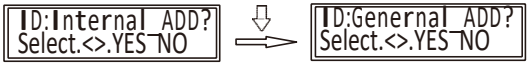


HART information

Enter the HART parameter

HART protocol unique address

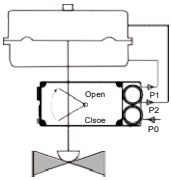
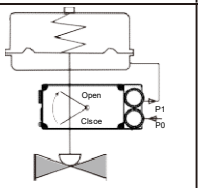
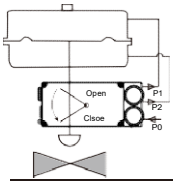
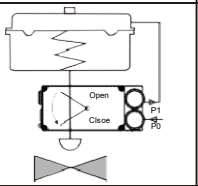
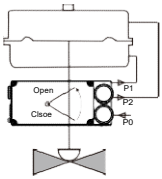
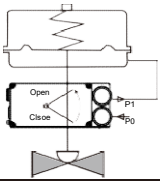
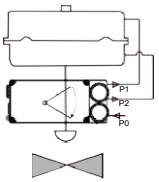
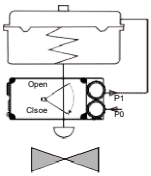
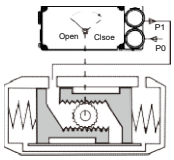
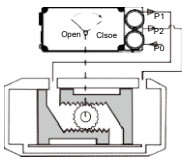
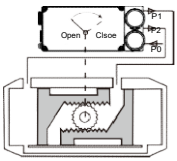
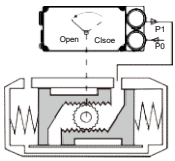
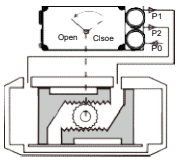
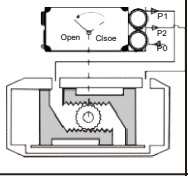
Compatible HARTprotocol fixed address



Compatible internal address of HART bus protocol

Compatible HART protocol common address

Appendix: sensor angle adjustment

Double acting Power loss P1=0 P2=P0	Type	Sensor initial angle	Stroke Angle Min	Nor	Max	**Single acting** Power loss P1=0	Type	Sensor initial angle	Stroke Angle Min	Nor	Max
	FC W+	about 30°	20°	50°	70°		FC W+	about 30°	20°	50°	70°
	FO W-	about 80°	20°	50°	70°		FO W-	about 80°	20°	50°	70°
	FC W-	about 80°	20°	50°	70°		FC W-	about 80°	20°	50°	70°
	FO W+	about 30°	20°	50°	70°		FO W+	about 30°	20°	50°	70°
FO T+		about 10°	20°	90°	90°		FC T+	about 10°	20°	90°	90°
 											
FO T-		about 100°	20°	90°	90°		FC T-	about 100°	20°	90°	90°
 											

Pneutork Valve Automation

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