

Intelligent Valve Positioner 1880S Series User's

(Please read the instruction manual carefully before installation and use)



Contents

1. Overview.....	1
1.1. Product structure	1
1.2. Product description and application.....	2
2. Installation.....	3
2.1. Mechanical dimensions.....	3
2.2. Actuator combination.....	4
2.3. Interface angle adjustment	7
3. Connection description	8
4. Technical data	10
4.1. Working data	10
4.2. Electrical data.....	10
4.3. Mechanical data	10
4.4. Pneumatic data	10
5. Operation.....	11
5.1. Interface description.....	11
5.2. Operating mode and operating interface.....	12
5.3. Main menu	14
5.3.1. INPUT.....	14
5.3.2. AUTO TUNE.....	15
5.3.3. ADD FUNC	17
5.3.3.1. CHARACT	18
5.3.3.2. CUTOFF	21
5.3.3.3. DIR CMD.....	23
5.3.3.4. LIM STROKE.....	24
5.3.3.5. DEAD BAND	26

5.3.3.6. SAFEPOS	27
5.3.3.7. OUTPUT(optional)	27
5.3.3.8. SIG ERROR.....	28
5.3.3.9. CAL USER	29
5.3.3.10. MANU RATE	32
5.3.3.11. CODE	32
5.3.3.12. SET FACT.....	34
5.3.4. LANGUAGE	34
6. Trouble shooting	35
7. Attention	35
8. Warranty terms	38
9. Selection and ordering data.....	39

1. Overview

1.1. Product structure

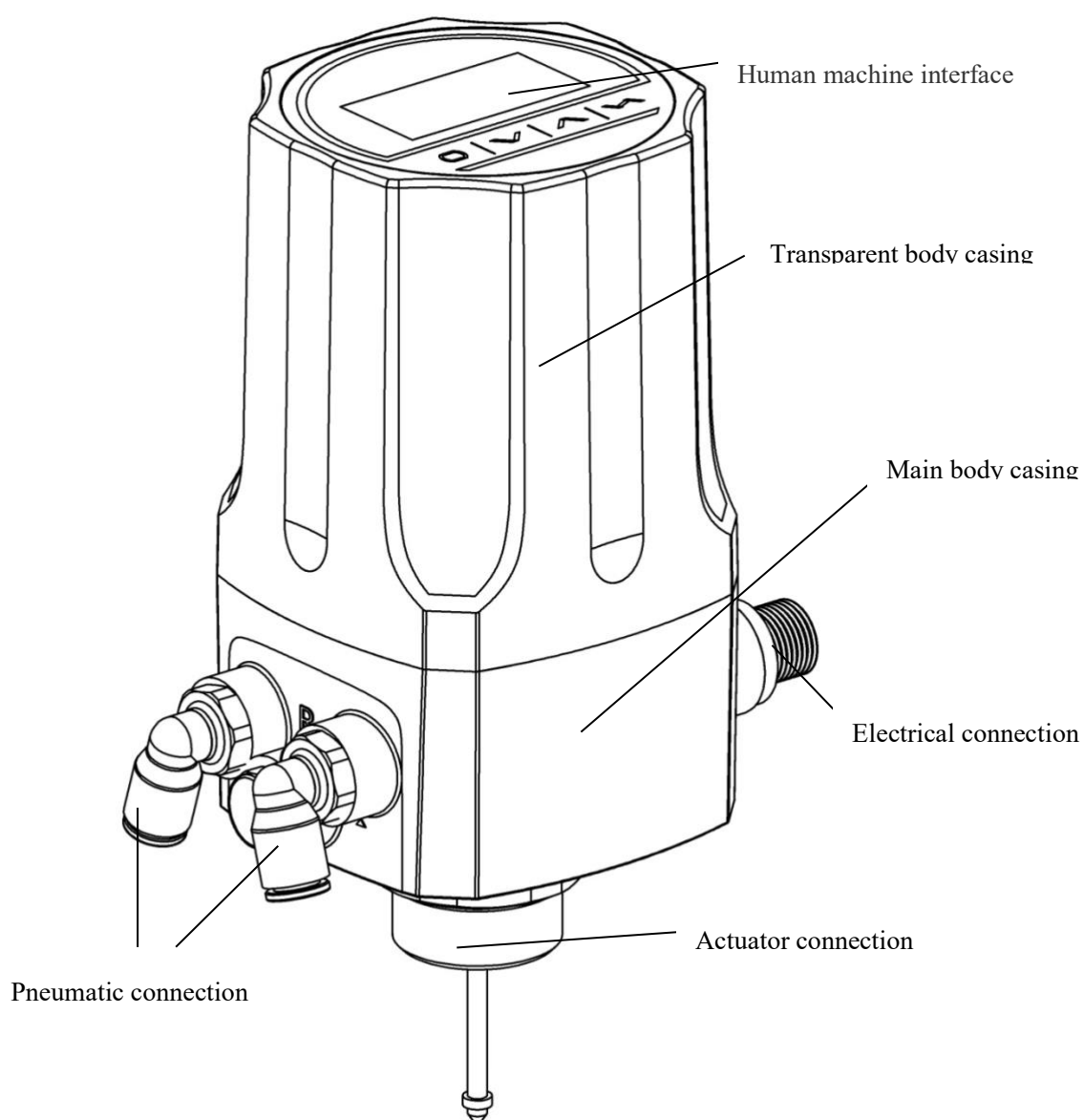


Figure 1. Positioner structure

1.2. Product description and application

1880S series intelligent valve positioner is a valve stroke controller based on microprocessor. The valve stroke can be set by external input signal. The positioner can adjust valve stroke quickly and accurately by using automatic control algorithm and PWM control technology, accordingly control the flow of fluid line.

The positioner can combine with different pneumatically actuated valves for using. As shown in Figure 2.



with diaphragm valve



with angle seat valve

Figure 2. Combinations of positioner and pneumatically actuated valves

The product can be used in sealed space and controlled automatically and remotely. It has a variety of auxiliary functions such as transfer characteristic, safety position, cut off, etc. It is easy to install, operate, maintain and has low failure rate.

2. Installation

2.1. Mechanical dimensions

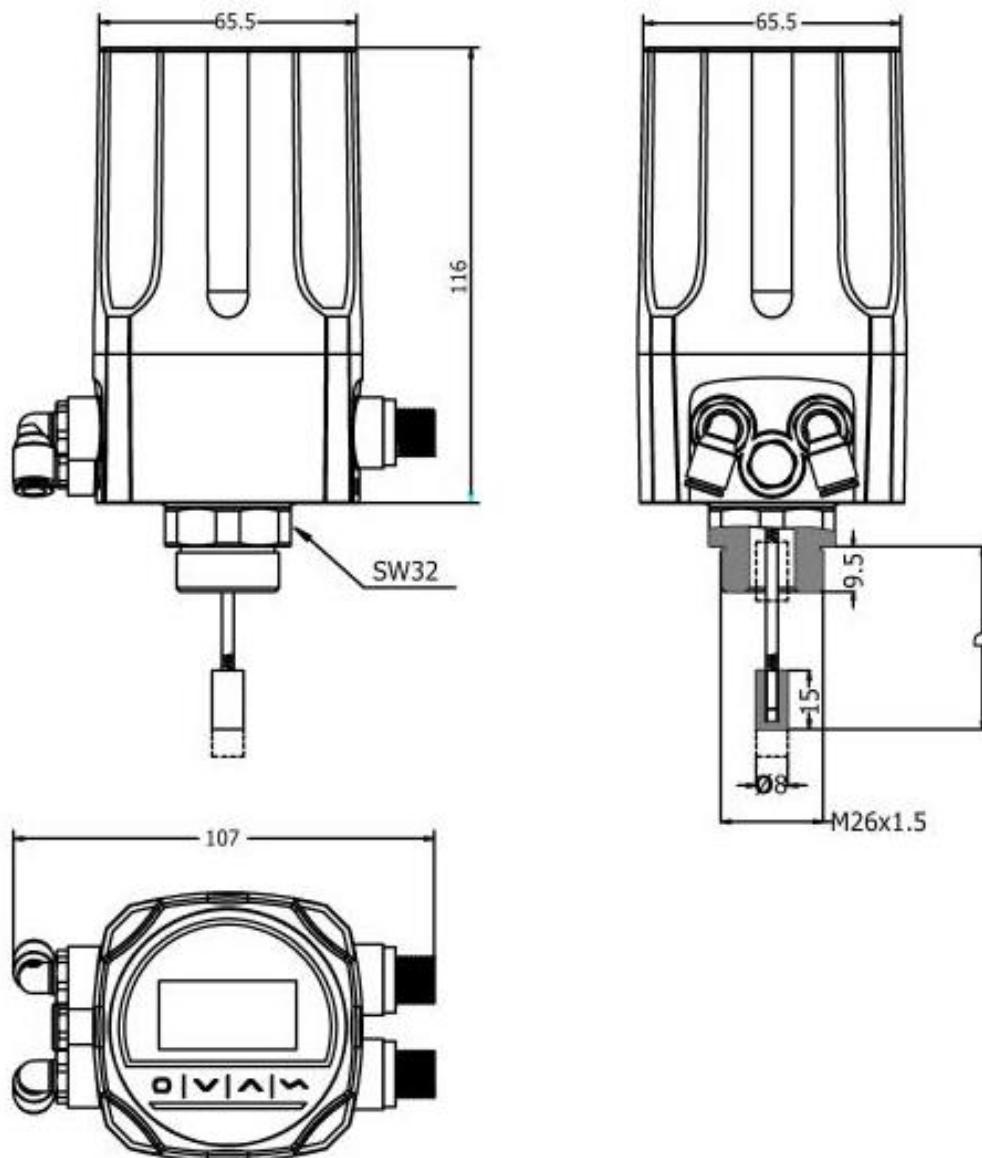


Figure 3. Mechanical dimensions

2.2. Actuator combination

1. Make sure that the stroke range and the screw thread size of the actuator which needs to combine meet the requirements.
2. Separately measure the C1 value when the valve is fully closed and C2 value when the valve is fully open by **the depth ruler**. The values are the distance between the stem top and the datum clamp face of the actuator. As shown in Figure 4.

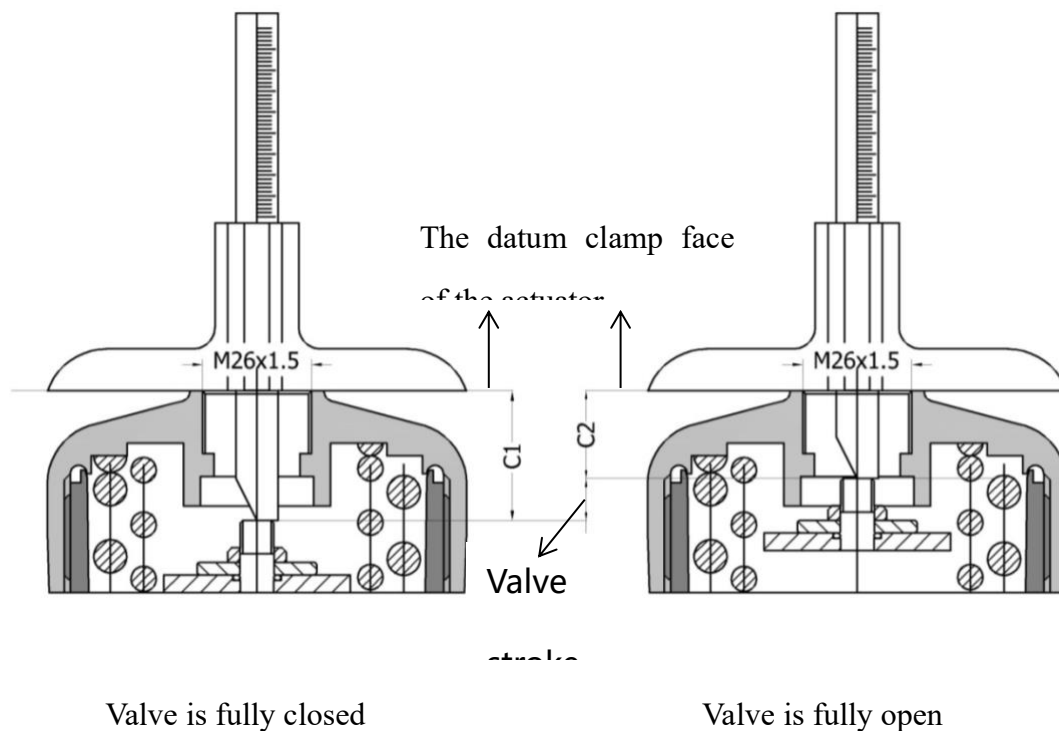


Figure 4. Actuator measurement

3. Adjust the adjusting nut of the displacement sensor. Then measure the D value (as shown in Figure 5) by **the depth ruler** in the state of the displacement sensor being completely loosened. Calculate the compression value $L1 = D - C1$, $L2 = D - C2$. It is recommended that the compression value L1 and L2 are both in the reference range which is showed in Table 1. If L1 value or L2 value is unable to meet the reference range, adjust the D value according to the actual situation.

NOTE!

The adjusted D value must ensure that $L1 > 0$, $L2 < \text{the maximum compression value of the displacement sensor}$. Otherwise, the positioner cannot match the actuator.

Maximum valve stroke	D range	L1, L2 reference range
5~25 mm	45~51 mm	3~28 mm

Table 1. The reference range of the compression value

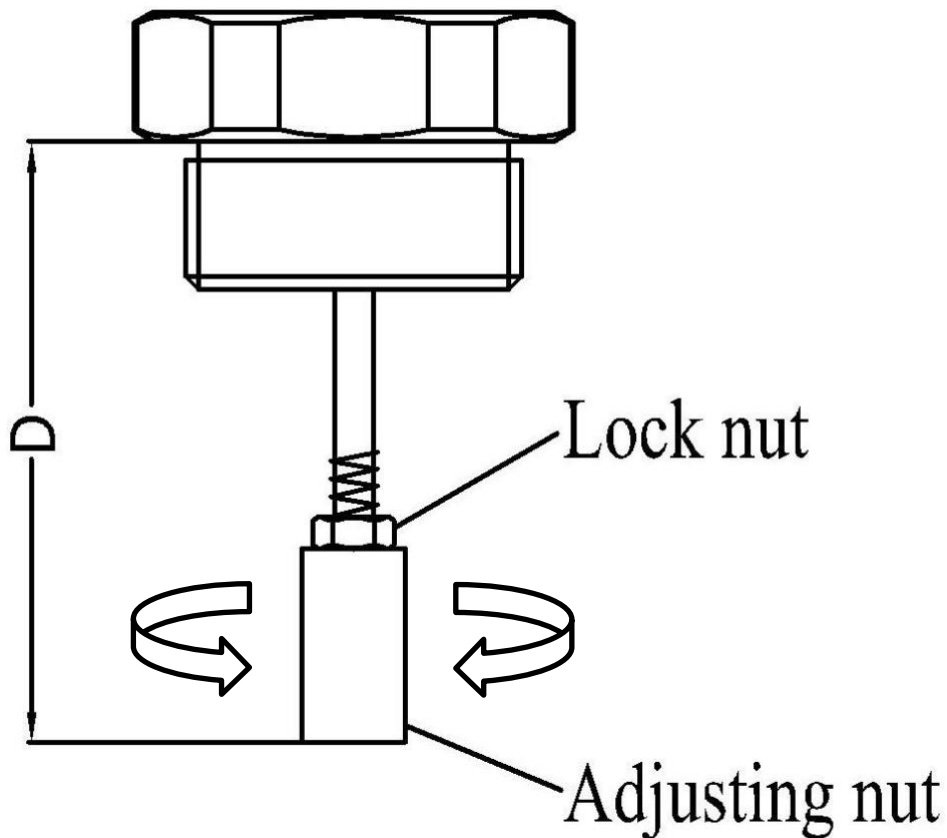


Figure 5. Travel sensor adjustment and measurement

4. Raise the internal valve stem of the actuator to the highest position. Make the actuator connection of the positioner entering into the thread connection of the actuator by **NO.32 wrench**. As shown in Figure 6.

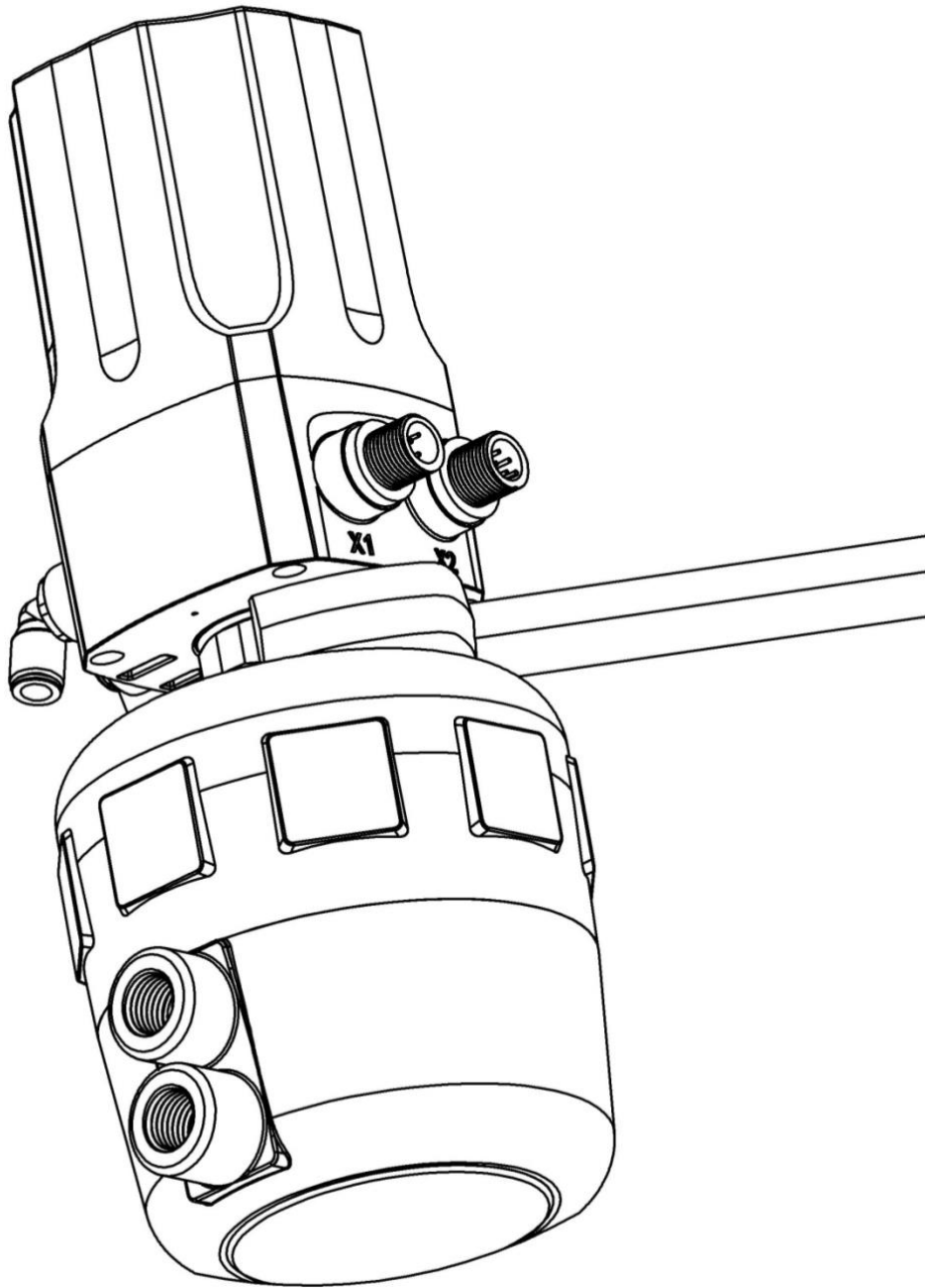


Figure 6. Actuator Combination

2.3. Interface angle adjustment

The angle can be adjusted between the positioner and the valve. If need to adjust the interface angle, rotate the main body casing clockwise or counter-clockwise in 180° range.

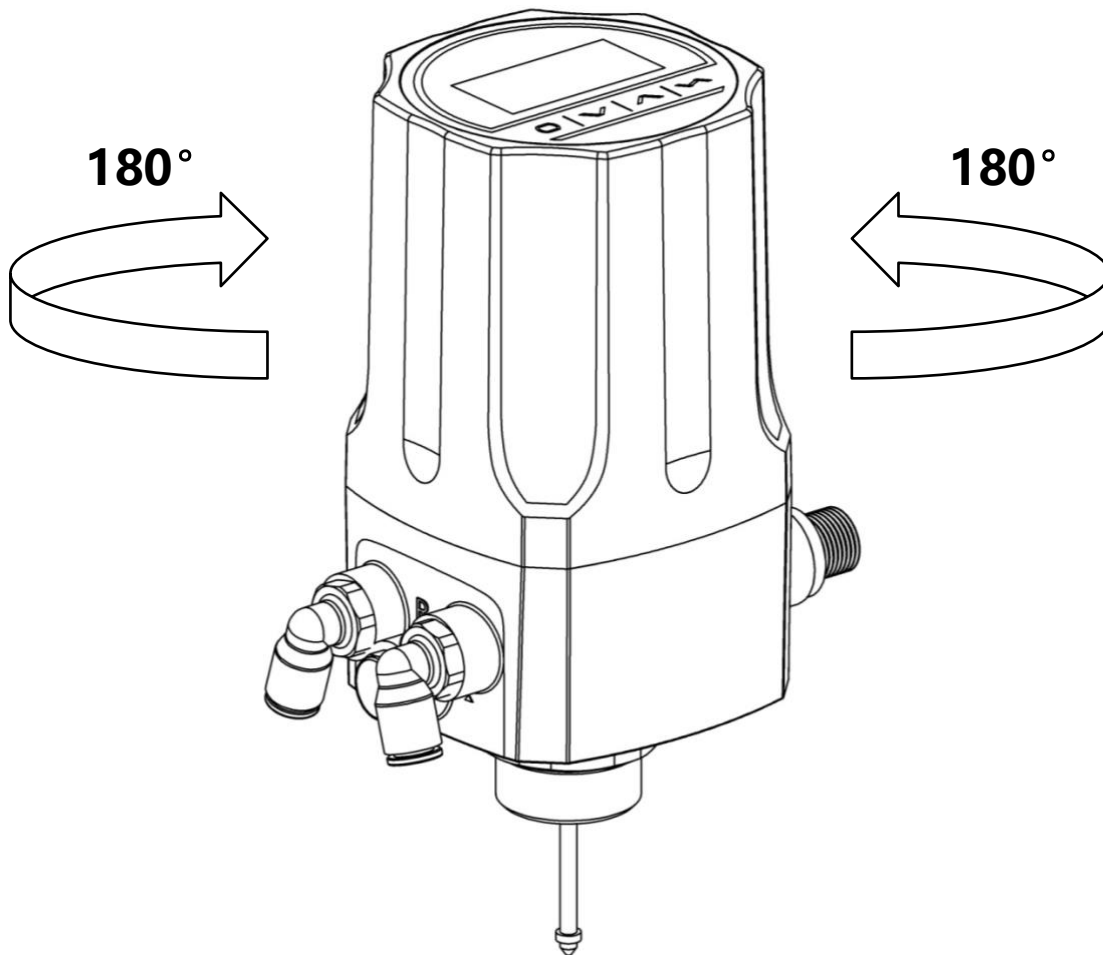


Figure 7. Graph operation

3. Connection description

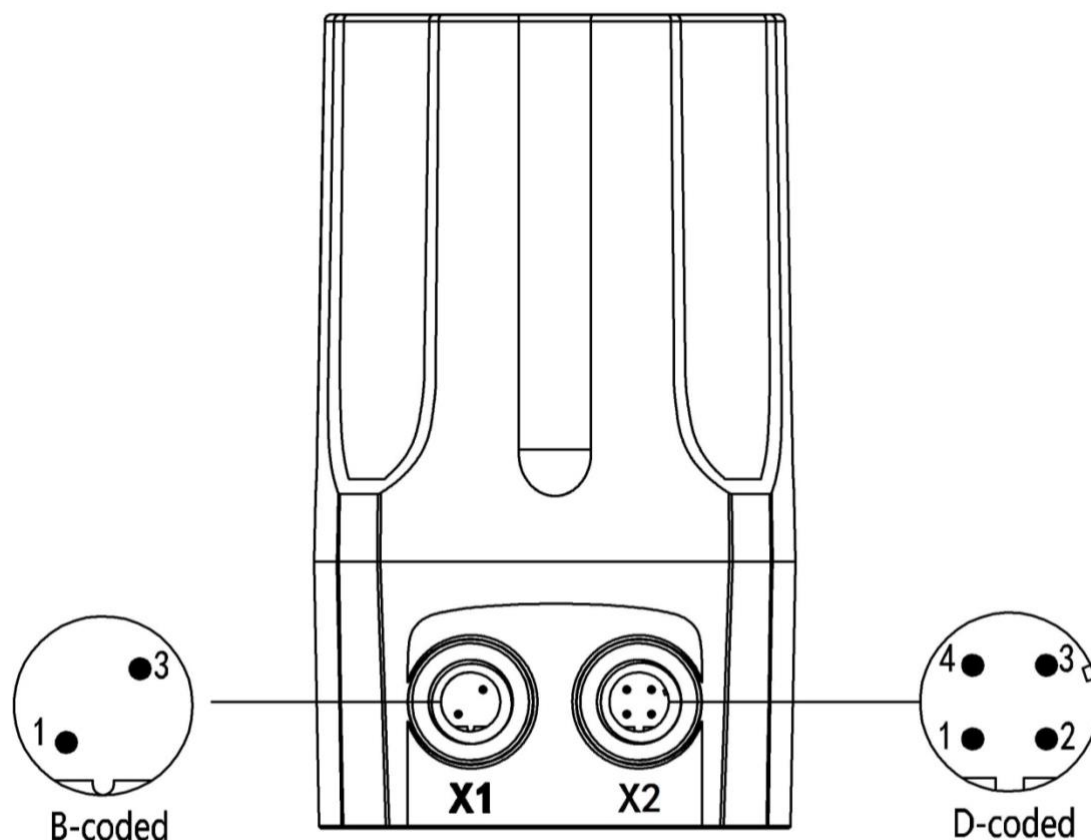


Figure 8. Connection

Connection	Pin	Description	Signal Type
X1	1	Analogue signal output +	0/4 – 20 mA
	3	Analogue signal output GND	GND

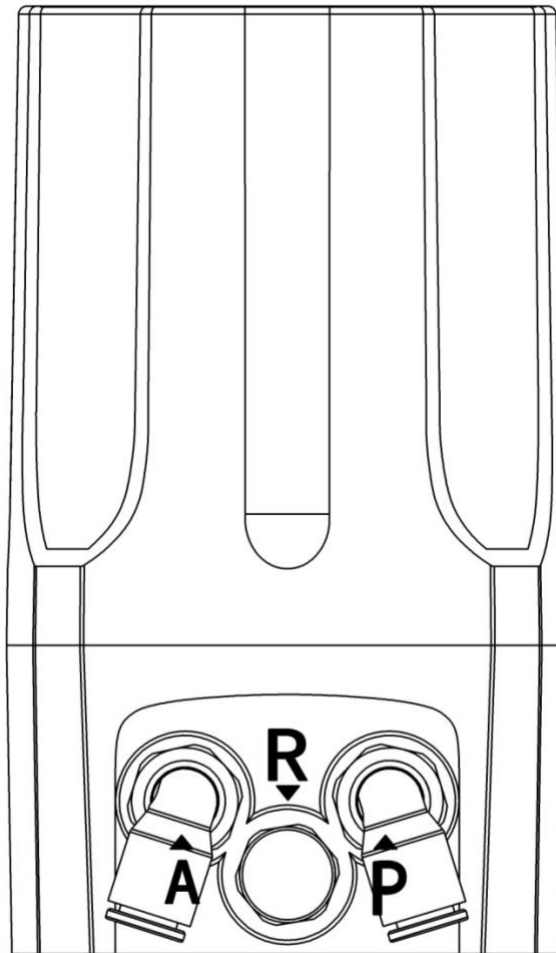
Table 2. Electrical connection description – X1(optional)

Connection	Pin	Description	Signal Type
X2	1	Power supply +	+24 V
	2	Power supply GND	GND
	3	Set signal input +	0/4 – 20 mA
	4	Set signal input GND	GND

Table 3. Electrical connection description – X2

NOTE !

Error connection of the electrical pin may cause the positioner damage.



Connection	Description
P	Air supply enter (built-in filter, filter size 20 μm)
R	Air exhaust
A	Pilot air outlet

Table 4. Pneumatic connection description

NOTE !

The air source pressure bigger than 7 bar may cause positioner damage.

4. Technical data

4.1. Working data

Ambient temperature: 0~60 °C

Protection class: IP67

Vibration resistance parameter: 100Hz

4.2. Electrical data

Connections: cable gland

Supply voltage:

24 V DC $\pm 10\%$, $\geq 1\text{A}$. Recommend switching-mode power supply.

Power input: $<5\text{W}$

Input resistance for set-point signal: 120Ω

Analogue output signal: maximum load 560Ω

4.3. Mechanical data

Cover material: Polycarbonate (PC)

Sealing material: Silicone rubber (SI)

Main body material: Polyamide Resin (PA6-GF30)

Control stroke range: 5-25 mm

4.4. Pneumatic data

Air pressure range: 3~7 bar, specific values depending on the actuator

Connections: Plug-in hose connector G1/4

Air quality:

ISO 8573-1

Solid particle size and density Class 3

Dew point	Class 3
Oil content	Class 3
Air flow rate: 17L/min (input pressure of 0.6Mpa)	

5. Operation

5.1. Interface description

The positioner includes a 4-key control panel and two displays. The main display is located directly above the housing. User can switch the display and set parameters and functions on the main display by pressing the four keys. The functions of the keys are represented at the bottom of the main display. The secondary display is located on the side of the housing, allowing the user to view the valve position value from the side.



Figure 9. Main display and keys



Figure 10. Secondary display

5.2. Operating mode and operating interface

The positioner has two operating mode: automatic mode (AUTO) and manual mode (MANU).

The positioner default operates in the automatic mode when powering up. At this time, the interface is locked. To unlock the interface, it needs to press both two  keys for about 3 seconds.

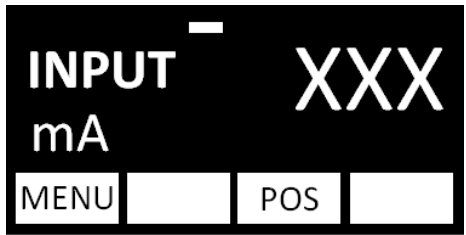
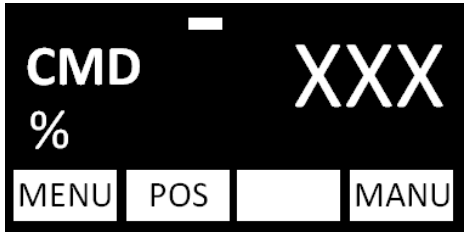
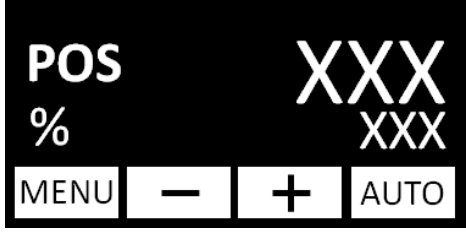
In the automatic mode, the positioner accepts the input signal for set-point value and adjusts the valve stroke automatically.

In the manual mode, user must press the “+/-” key to adjust the valve stroke manually. The set-point value is the current valve position after adjusting the valve stroke manually or the current valve position after switching from the automatic mode to the manual mode. It is displayed on the manual mode interface.

The operating mode can be switched by AUTO key and MANU key if BINARY IN function is not enabled for switching the operating mode. If enabling the BINARY IN

function for switching, switching by function keys is not effective.

User can switch the operating interface by the function keys. The operating interfaces are described in Table 5. The interface will be locked if no keys are pressed for a long time. To unlock the interface, it needs to press both two  keys for about 3 seconds. Under the locked interface, when the keys are not pressed for a long time, the LCD will display screensaver interface. Press any key to exit the screensaver interface.

Display	Description
	Current position in the automatic mode. Press “POS” key or “AUTO” key to display.
	The value of input signal in the automatic mode. Press “INPUT” key to display.
	The set-point value in the automatic mode. Press “CMD” key to display.
	Current position value (big font) and position set-point value (small font) in the manual mode. Press “MANU” key to display.

	Screensaver interface. It displays the valve position value. The cursor is displayed in automatic mode.
---	--

Table 5. Operating interface

5.3. Main menu

User can operate specific function or set specific parameters under the main menu. If the menu is not operated for a long time, the system will automatically exit from the menu interface to the automatic mode locked interface.

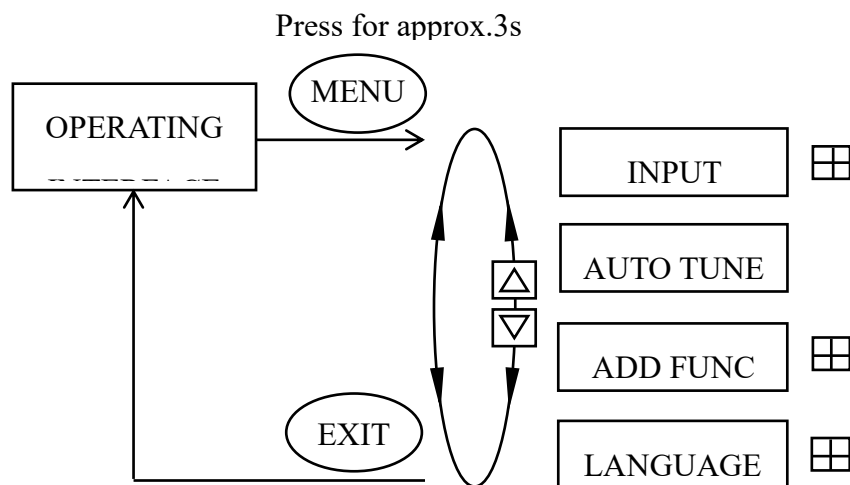


Figure 11. Operating structure main menu

5.3.1. INPUT

The option is used to select the type of the input signal for set-point value. The signal type is 4-20 mA after factory settings.

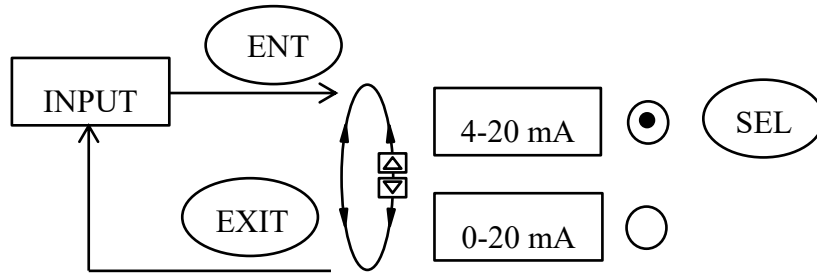


Figure 12. Operating structure INPUT

5.3.2. AUTO TUNE

The function can test the related control parameters including the direction between the aeration state of the actuator and the actual position, the total valve scale, PWM parameters. The whole process will continue for about 2-3 minutes if running normally.

System will check whether the whole valve stroke range is in the effective range of the displacement sensor during the automatic adjustment process. When the whole valve stroke range is out of the effective range of the displacement sensor, if the minimum value of the whole valve stroke range is smaller than the minimum value of the effective range of the displacement sensor, OLED displays “POS MIN ERROR”, if the maximum value of the whole valve stroke range is larger than the maximum value of the effective range of the displacement sensor, OLED displays “POS MAX ERROR”. If OLED displays the error information above, it is need to re-match the positioner and the actuator, refer to Chapter 2 for details.

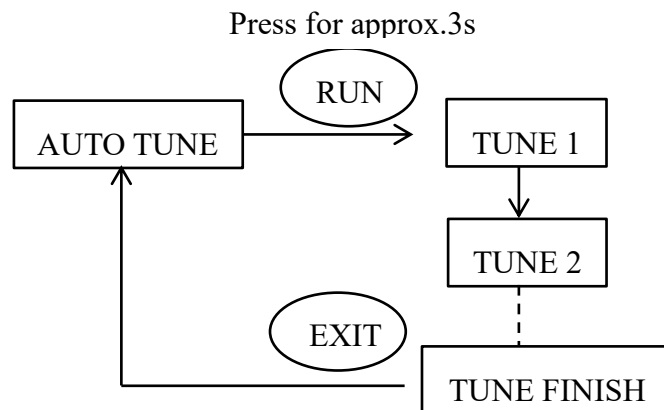


Figure 13. Operating structure AUTO TUNE

NOTE !

- Although the positioner has ran the automatic adjustment function in the factory. In order to get the control parameters of the actual work environment, the positioner must run the function again in the actual work environment.
- Make sure that the air supply pressure is in the working range of the actuator and has no big wave. Otherwise the automatic adjustment may fail or the test

5.3.3. ADD FUNC

The option includes auxiliary functions.

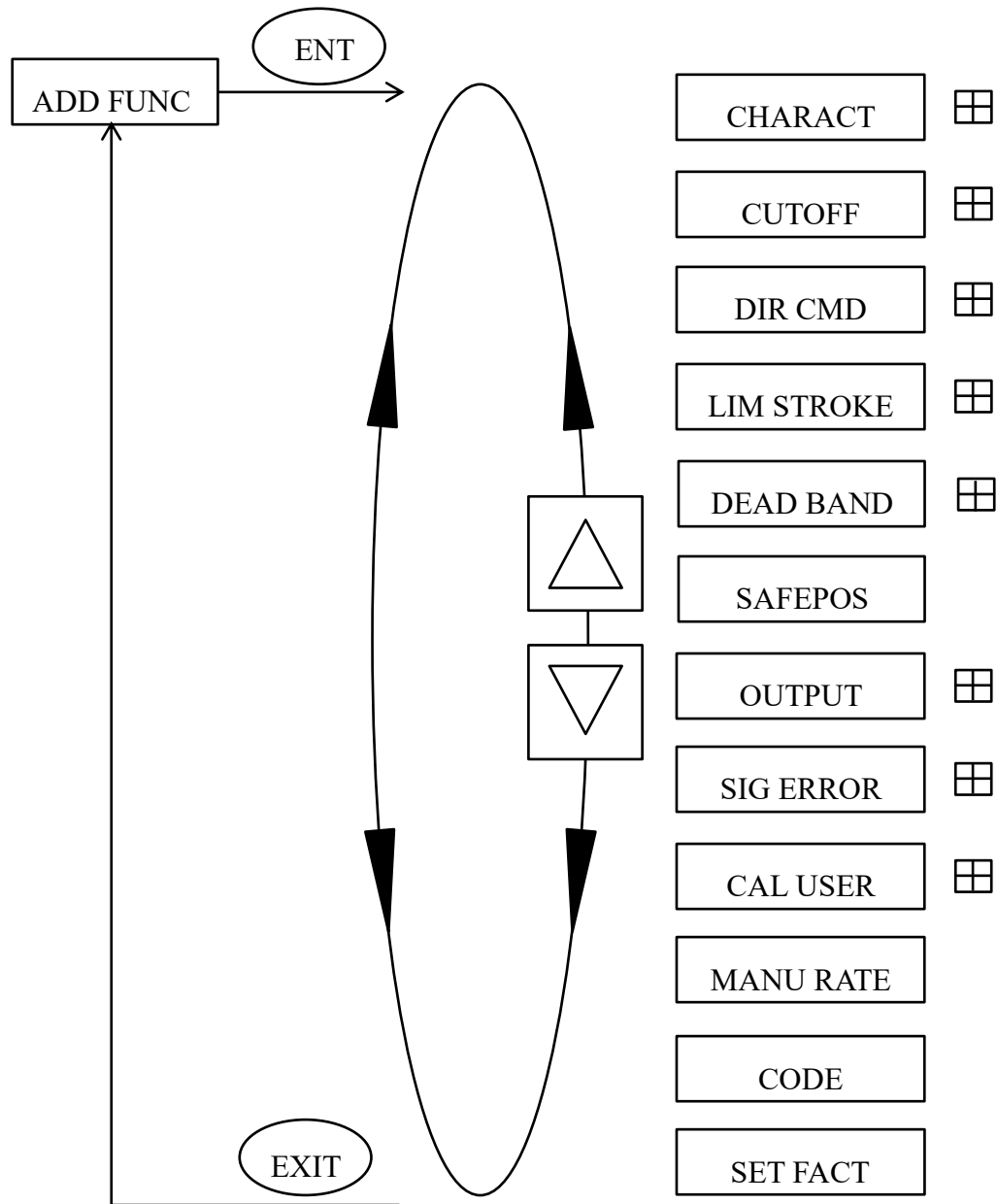


Figure 14. operating structure ADD FUNC

5.3.3.1. CHARACT

Factory setting:

CHARACT option: LINEAR

EQ PERC option: 1:25

FREE value: 0%, 5%, 10%.....95%, 100%

The CHARACT function is to determine the relationship between position set-point value and valve stroke. In the actual control system, the controlled variable is usually required to have specific control characteristic, such as linearity. User can select or set the characteristic option to meet the control requirement in the function menu.

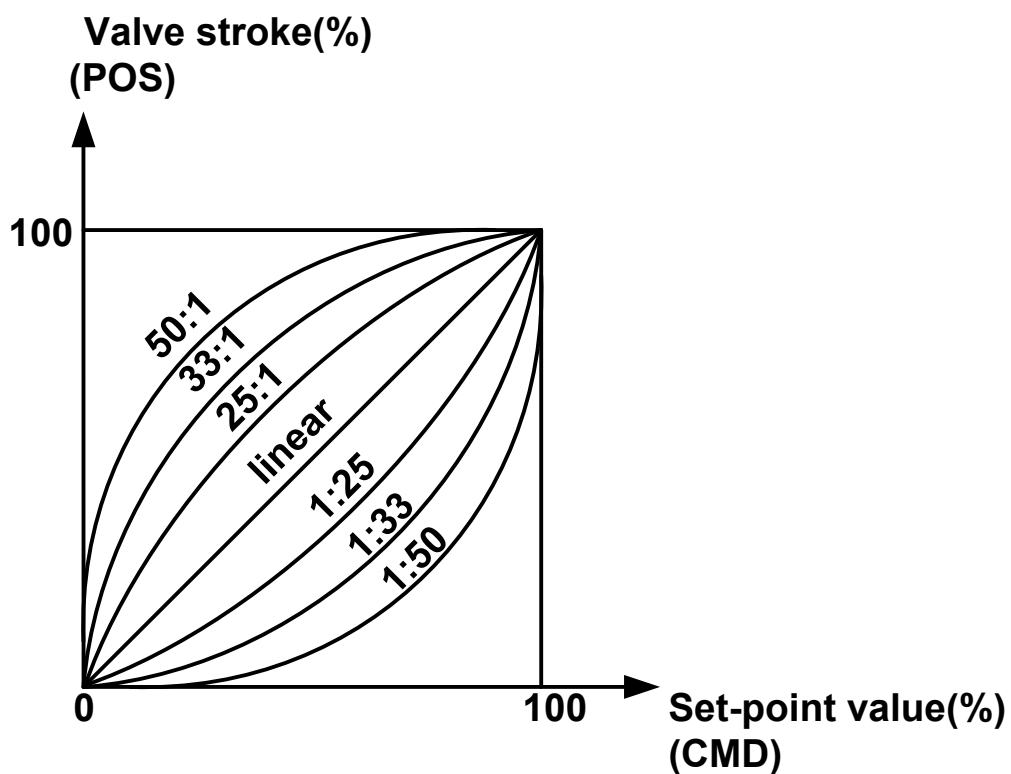


Figure 15. Graph characteristics of linear and equal percentage

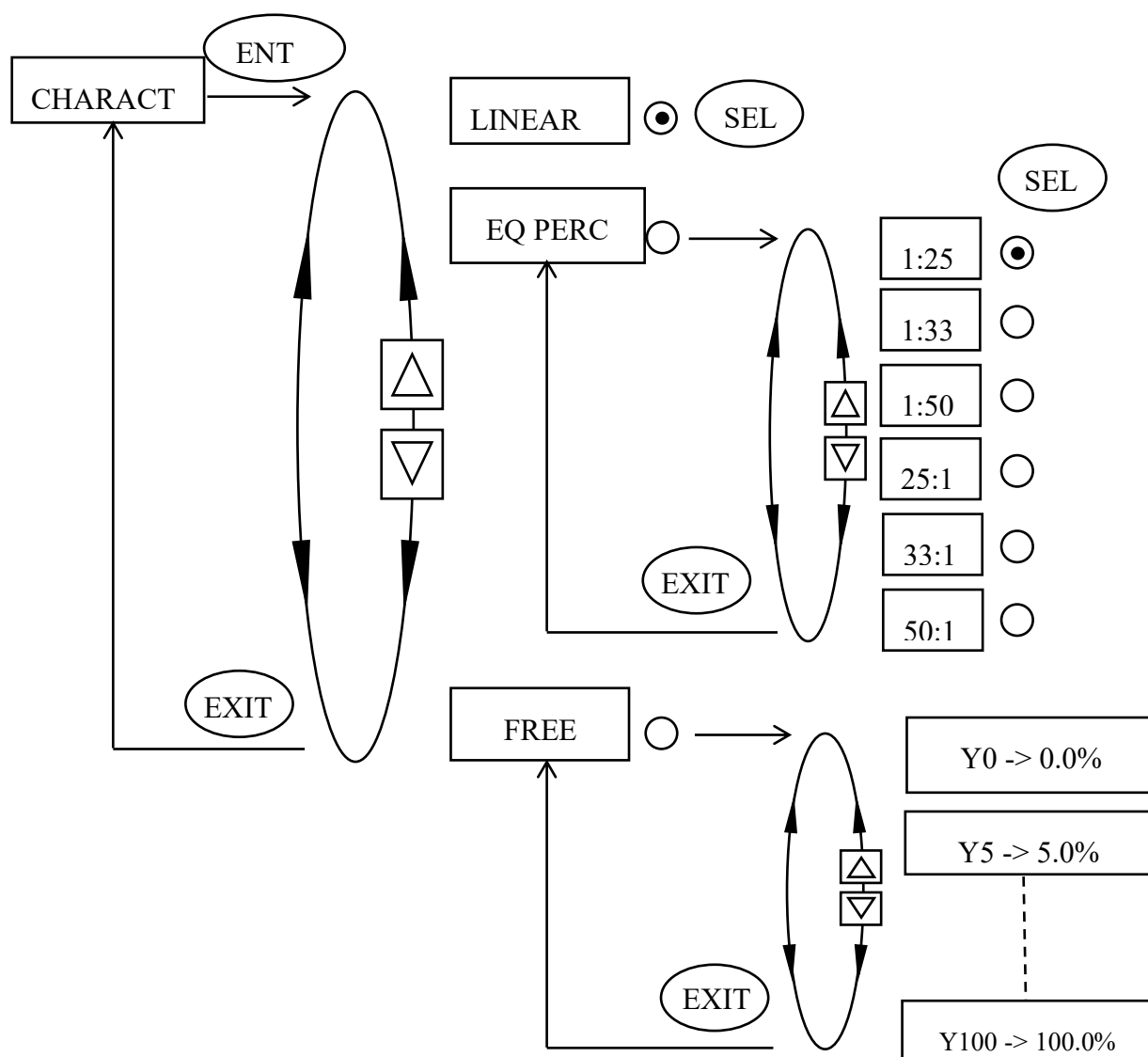


Figure 16. Operating structure CHARACT

Option	Description
LINEAR	1:1 linear transfer relationship between position set-point value and valve stroke.
EQ PERC	Equal percentage transfer relationship between position set-point value and valve stroke.
FREE	Freely programmable transfer relationship between position set-point value and valve stroke for user.

Table 6. Option CHARACT

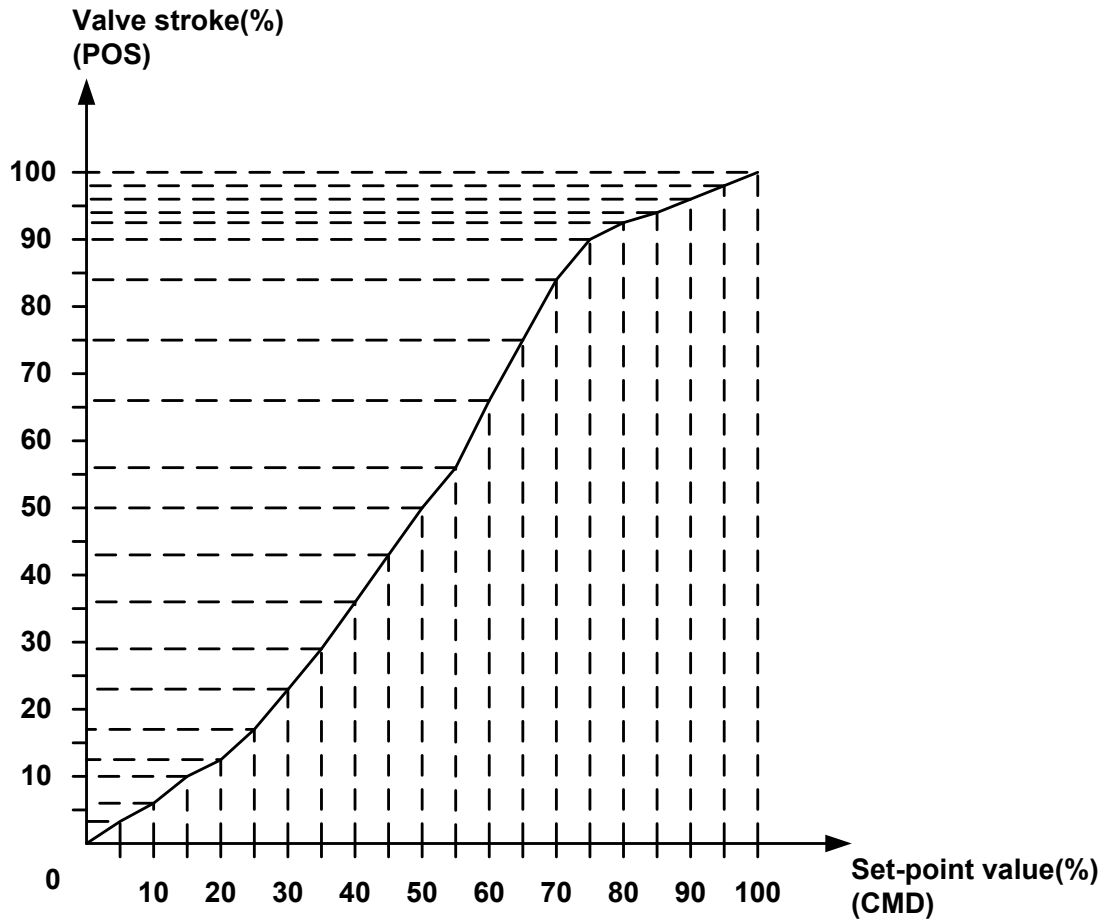


Figure 18. Graph CHARACT FREE

5.3.3.2. CUTOFF

Factory setting:

AUTO CUT MIN value: 1%, AUTO CUT MAX value: 99%

MANU CUT MIN value: 2%, MANU CUT MAX value: 98%

When the percentage of set-point value is in the enabled range of CUTOFF, the valve is fully deaerated or aerated. The valve is fully close when the percentage of set-point value is less than or equal to MIN setting parameter and is fully open when the percentage of set-point value is greater than or equal to MAX setting parameter.

The function divides into AUTO CUT function in the automatic mode and MANU CUT function in the manual mode. Parameter MIN range: 0-25%, Parameter MAX range: 75-100%. When the function is enabled, the sign “cut off ” is indicated on the

operating interface.

In the automatic mode, when the MIN data is 0%, CUTOFF for closing the valve is inactive; when the MAX data is 100%, CUTOFF for opening the valve is inactive.

When the positioner is running the function, due to the actuator internal characteristics, the valve position will have some deviations after the valve being fully closed or fully opened. As a result, the position value may be smaller than 0% when the valve is fully closed or bigger than 100% when the valve is fully opened.

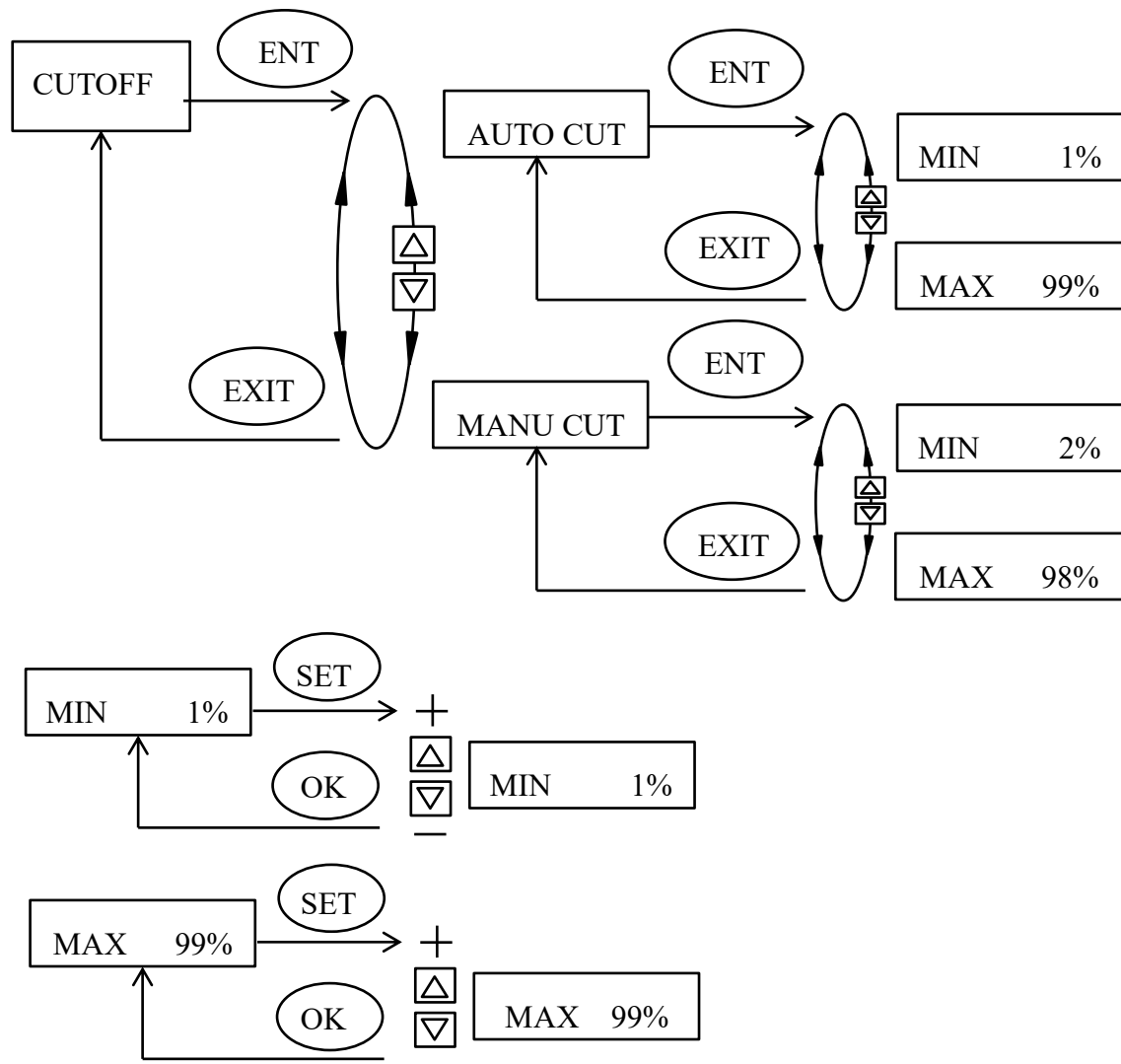


Figure 19. Operating structure CUTOFF

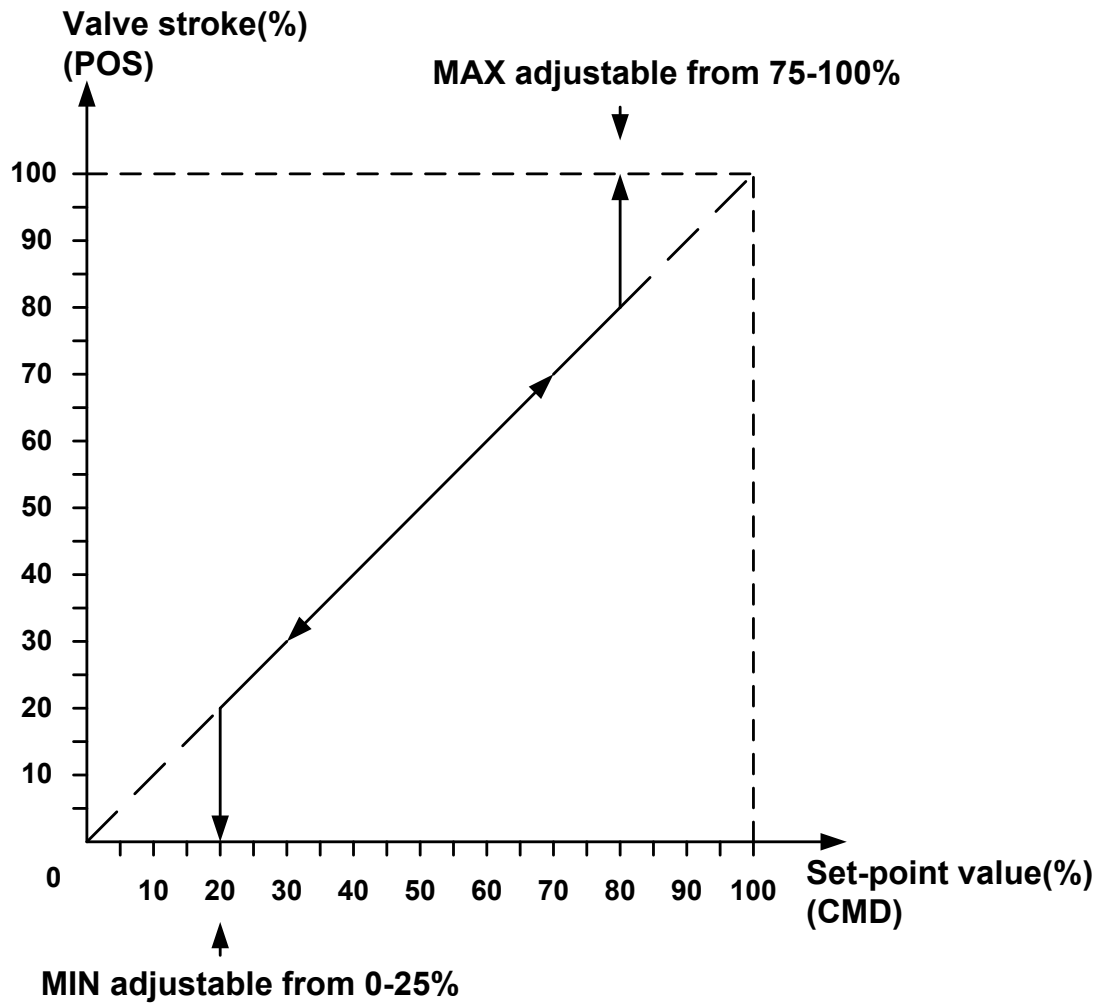


Figure 20. Graph CUTOFF

5.3.3.3. DIR CMD

Factory setting:

DIR CMD option: RISE

The function is to set the effective sense of direction between the input signal and the position set-point value (CMD).

RISE: 0/4 mA → 0%, 20 mA → 100%.

FALL: 0/4 mA → 100%, 20 mA → 0%.

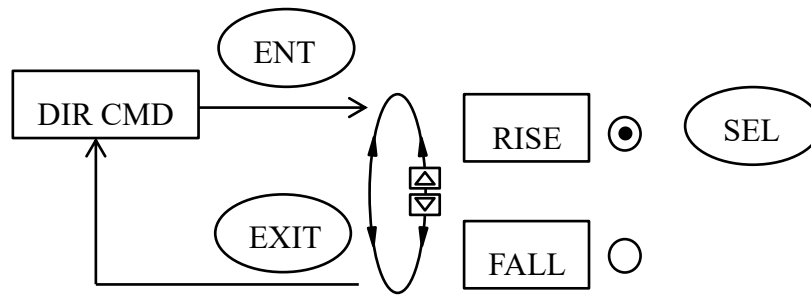


Figure 21. Operating structure DIR CMD

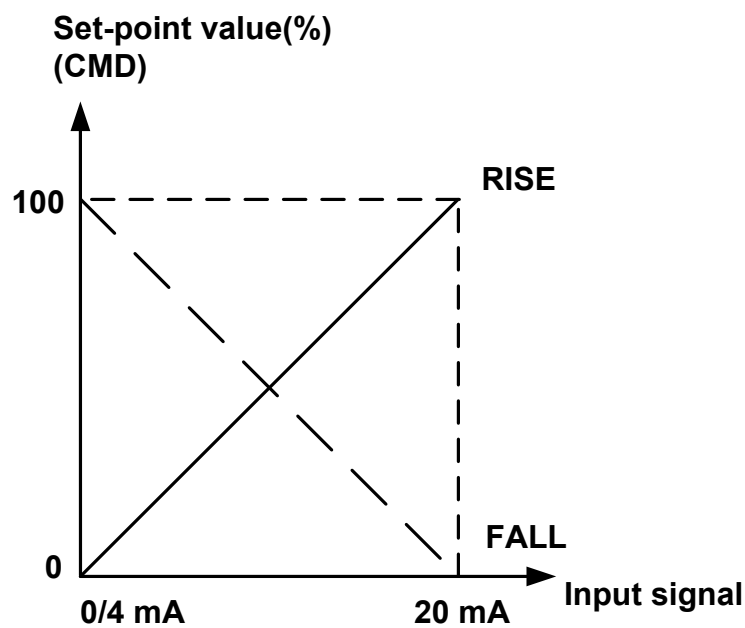


Figure 22. Graph DIR CMD

5.3.3.4. LIM STROKE

Factory setting:

LIM STROKE MIN value: 0% (unlimited)

LIM STROKE MAX value: 100% (unlimited)

The function limits the automatic adjustment range in the whole valve physical stroke. After setting the limit value, the value of valve stroke (POS) on the display may bigger than 100% or smaller than 0%.

MIN adjustment range: 0 – 50 % of the total physical stroke.

MAX adjustment range: 50 – 100 % of the total physical stroke.

The minimum gap between Min and Max is 50 % of the total physical stroke.

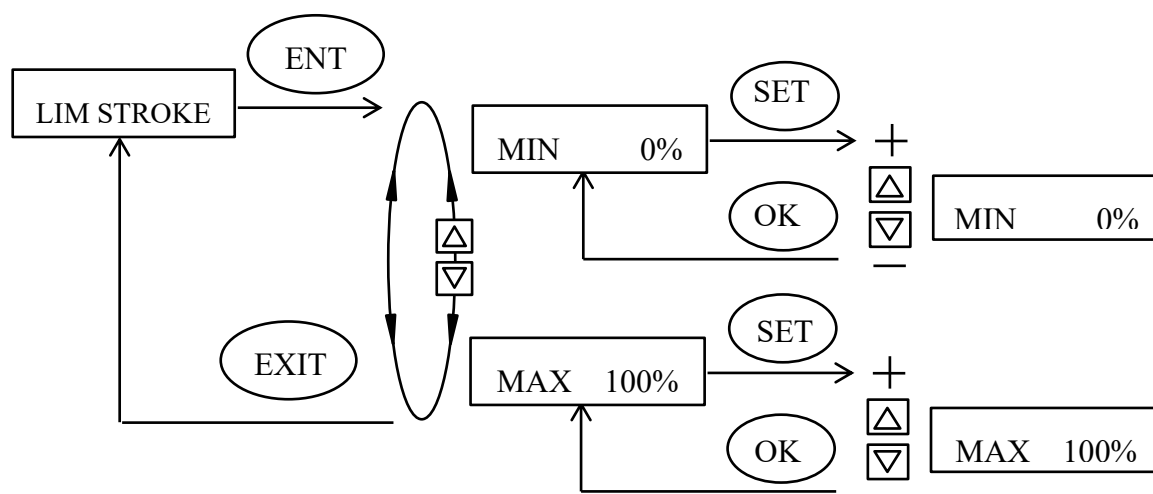


Figure 23. Operating structure LIM STROKE

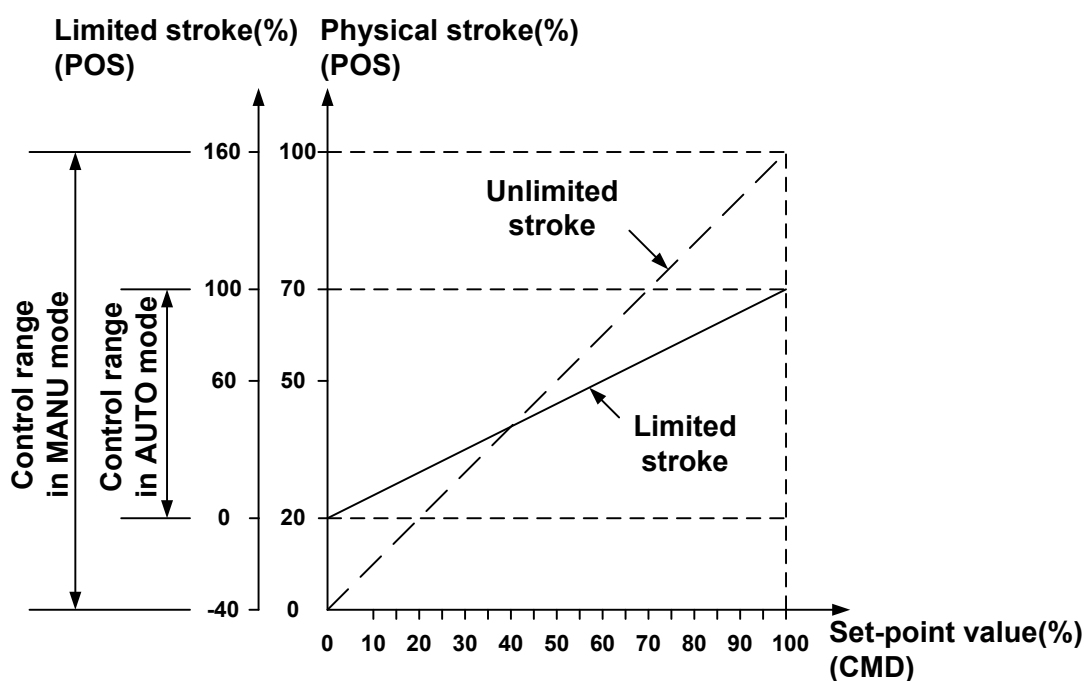


Figure 24. Graph LIM STROKE

NOTE !

Please do not set the minimum gap between Min and Max too small in application, since it may increase the difficulty of valve stroke adjustment. If to do so for necessary, please change the AUTO DB value bigger.

5.3.3.5. DEAD BAND

Factory setting:

AUTO DB value: 1%

MANU DB value: 1%

The system does not adjust the valve stroke when the gap between the stroke value and the position set-point value is not bigger than the dead band value. The dead band value is divided into automatic dead band value and manual dead band value. The automatic dead band value corresponds to limited scale of the valve stroke. The dead band range is 0.1%-10%.

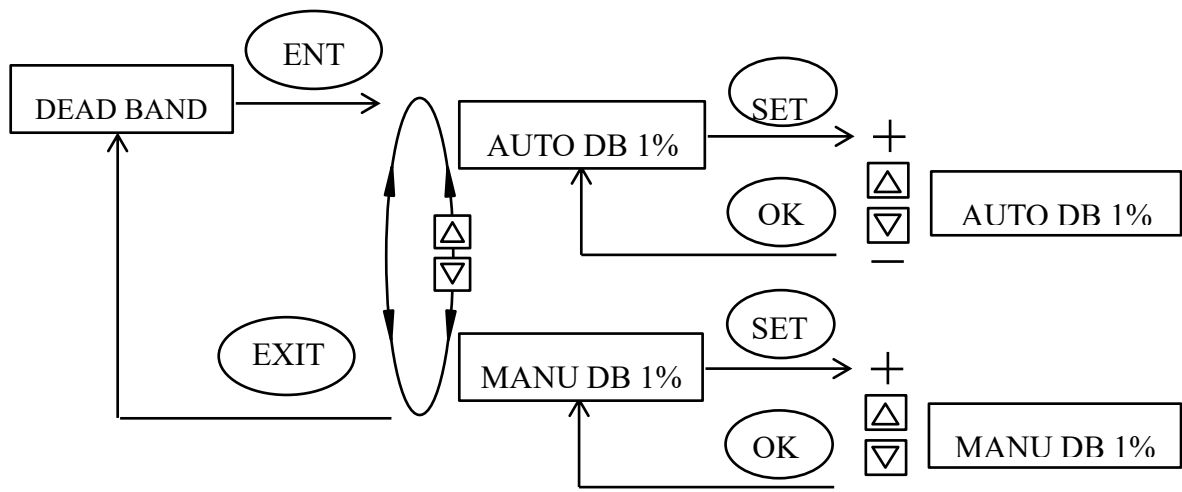


Figure 25. Operating structure DEAD BAND

NOTE !

The smaller the dead band setting, the higher the control accuracy getting.
Please set the dead band value in reason. Because the too small value may cause the solenoid valve in the body to act frequently and lead to long adjustment time and unstable working state.

5.3.3.6. SAFEPOS

Factory setting:

SAFEPOS value: 0%

The function is used to set a safety position which the valve stroke is adjusted to for some specific conditions. The safety position is adjusted by the binary input signal or an error signal for set-point value. When the adjustment for the safety position is enabled, the sign “safe pos” is indicated on the operating interface.

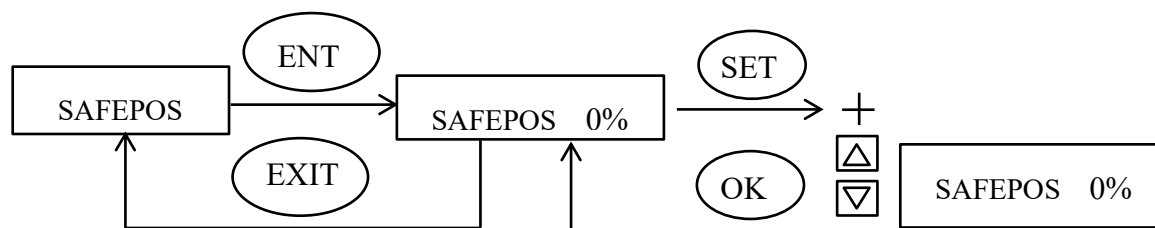


Figure 26. Operating structure SAFEPOS

5.3.3.7. OUTPUT(optional)

Factory setting:

ANALOGUE option: POS

ANALOGUE TYPE option: 4-20 mA

The function is used to output analogue signal of the current position (POS) or of the set-point value (CMD). Two output signal type (4-20mA, 0-20mA) can be selected. If the product selection has no feedback signal, this function is invalid.

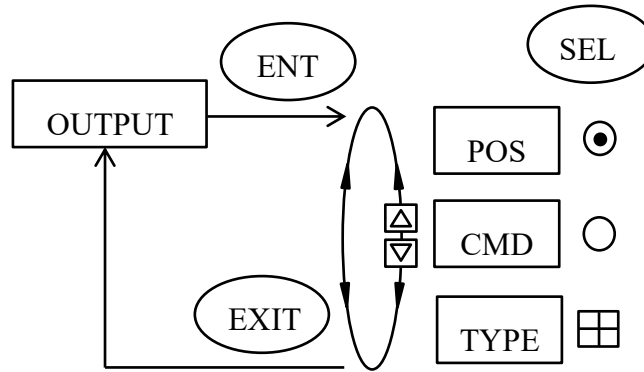


Figure 27. Operating structure OUTPUT

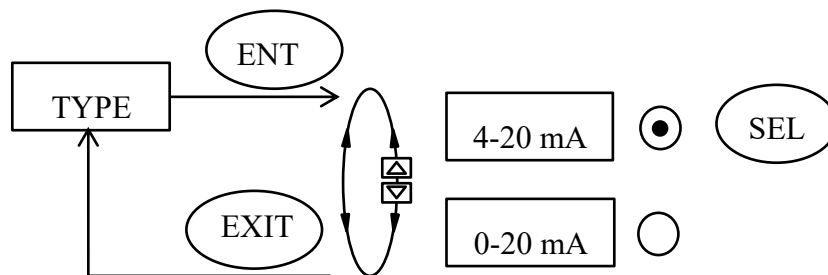


Figure 28. Operating structure OUTPUT TYPE

5.3.3.8. SIG ERROR

Factory setting:

SIG ERROR option: ERROR OFF

SIG ERROR SAFEPOS option: CLOSE

The function is used to detect the error of 4-20mA input signal, but cannot detect input signal of other types. The error condition is the value of 4-20mA input signal $\leq 3.5\text{mA}$. if opening the error detecting, the set-point value will instruct “ERROR” on the operating interface in the case of detecting the error signal. If the safety position is not enabled, the positioner will exhaust the actuator cylinder’s air.

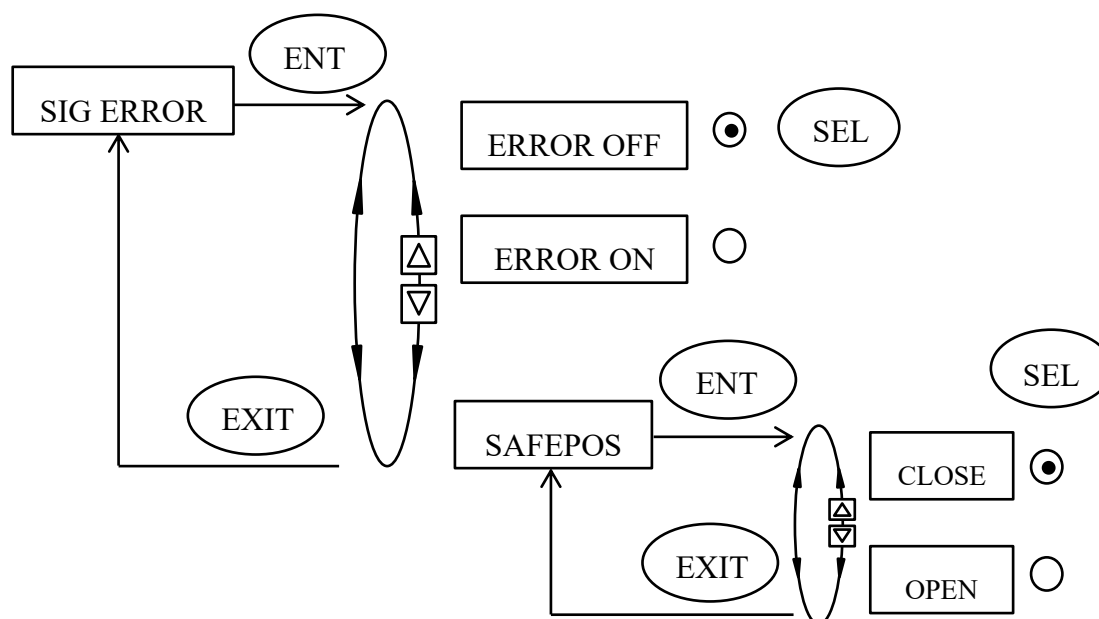


Figure 29. Operating structure SIG ERROR

Option	Description
ERROR OFF	Signal error detection is inactive.
ERROR ON	Signal error detection is active.
SAFEPOS	The SAFEPOS function is enabled by selecting OPEN and ERROR ON option when detecting the error signal.

Table 7. Option SIG ERROR

5.3.3.9. CAL USER

Factory setting:

CAL POS MIN: the AD value of minimum position by AUTO TUNE function.

CAL POS MAX: the AD value of maximum position by AUTO TUNE function.

CAL INPUT MIN for 4-20mA: 655

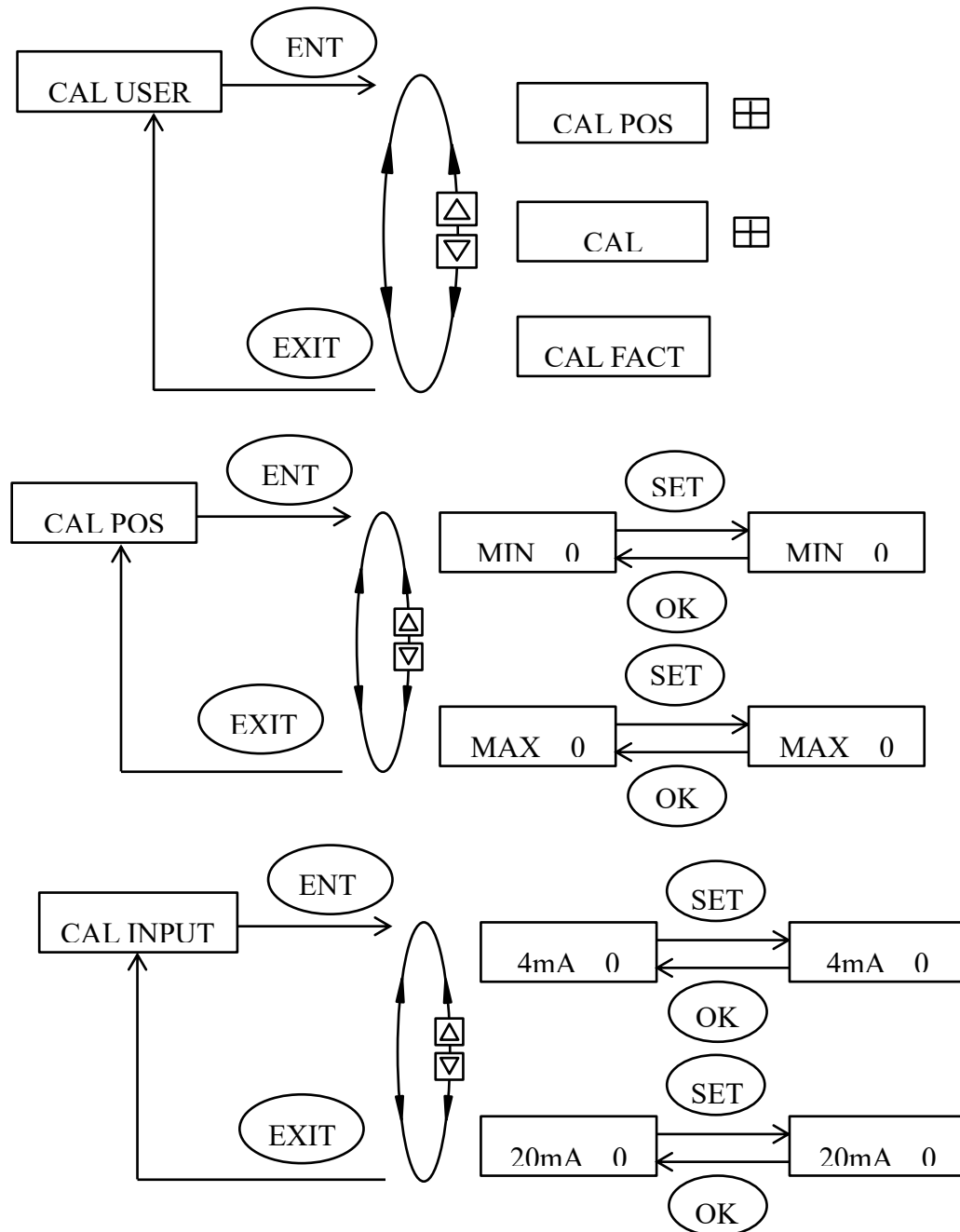
CAL INPUT MAX for 4-20mA: 3277

CAL INPUT MIN for 0-20mA: 0

CAL INPUT MAX for 0-20mA: 3277

The function is used to calibrate the scale value for valve stroke and input signal. And it is not recommended to be used for general users.

The value of calibration is a 12bit AD sample value in the system, the range is 0-4095.



Press for approx.3s



Figure 30. Operating structure CAL USER

Option	Description
CAL POS	Calibrating the scale values for valve stroke. When setting the MIN value, the actuator is fully close automatically. When setting the MAX value, the actuator is fully open automatically. The setting interface will display the present AD value of calibration and the lighted AD value of current position.
CAL INPUT	Calibrating the scale values for input signal. When setting the option, the actuator is fully deaerated and does not operate other functions. The setting interface will display the present AD value of calibration and the lighted AD value of current input signal.
CAL FACT	The parameters of CAL POS and CAL CMD reset to factory settings.

Table 8. Option CAL USER

When the system is running CAL POS or CAL INPUT function, user should watch the lighted changing value whether tends to be stable. The stable value can be judged according to the range of digital number changing less than 5 for a long time. After judging the stable value, press “OK” key on the display to record current changing value as the new calibration value. The recorded value may be different with the changing value which before recording.

NOTE !

Write down the current changing value before recording. The changing value to be recorded may be different with the value after being recorded. If the deviation of digital number between them is less than 3, the recorded value is available. Otherwise please run the calibration for the related value again.

5.3.3.10.MANU RATE

Factory setting:

GRADE : 2

The function is used for setting the rate for adjusting valve stroke in the manual mode.
The grade of adjustment rate: 1-5, 1 is the slowest adjustment rate, 5 is the fastest adjustment rate.

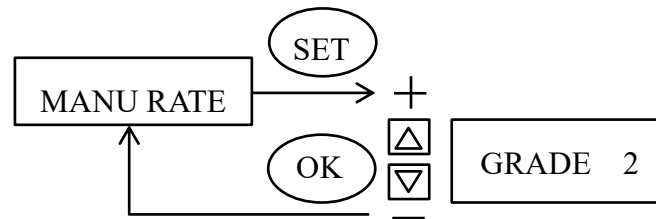


Figure 31. Operating structure MANU RATE

5.3.3.11.CODE

Factory setting:

Code: 0000

Protect options: none

The CODE function is to prevent some soft functions of the positioner being accessed.
If enabling the CODE function, it needs to input the code before opening the protected menu or running the protected functions.

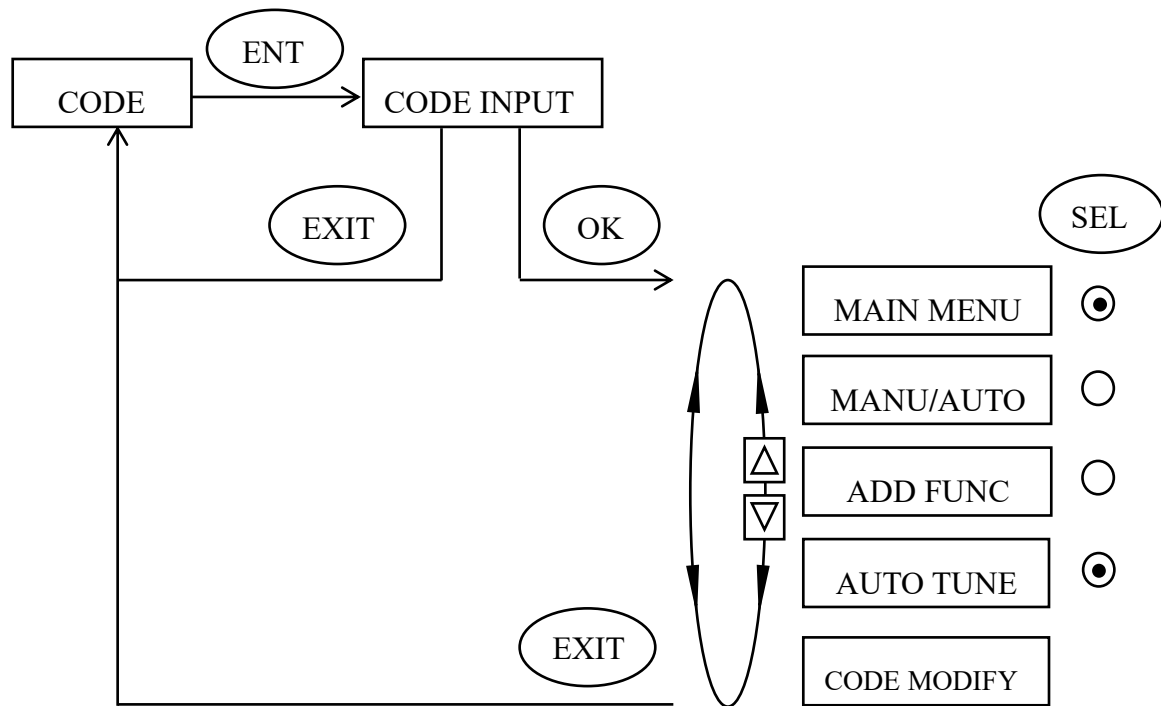


Figure 32. Operating structure CODE

Options	Description
MAIN MENU	Code protection for entering the main menu.
MANU/AUTO	Code protection for switching between automatic mode and manual mode.
ADD FUNC	Code protection for entering the auxiliary function menu.
AUTO TUNE	Code protection for running automatic adjustment.
CODE MODIFY	Modify the code for protected options and entering the CODE menu.

Table 9. Option CODE

5.3.3.12.SET FACT

All setting parameters reset to factory default value except the parameters of AUTO TUNE and CAL USER. To do so, enter the menu of auxiliary functions, then select the SET FACT option and press the “RUN” key for about 3s.

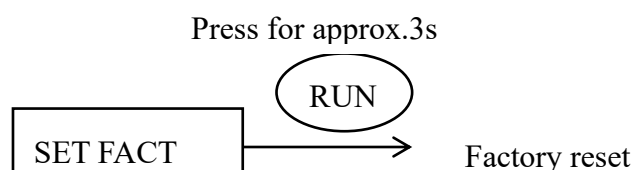


Figure 33. Operating structure SET FACT

5.3.4. LANGUAGE

The option is used to select the interface language.

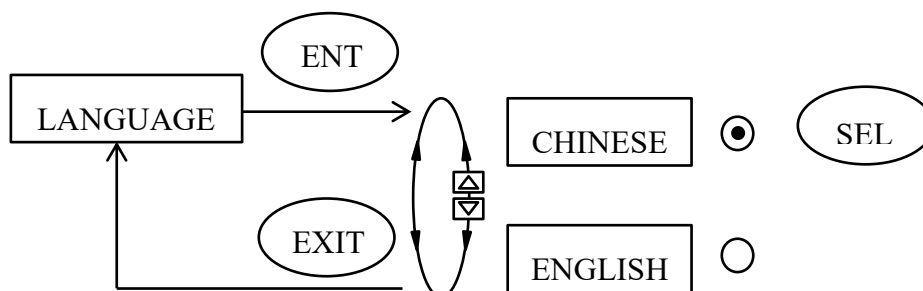


Figure 34. Operating structure LANGUAGE

6. Trouble shooting

1. Display does not light after the positioner powers up.

Make sure that the 24V DC power supply is normal.

Make sure that the power cables are connected correctly.

2. The positioner is unable to locate position. The valve cannot be fully opened or fully closed for a long time.

Make sure that the pressure of air supply meets the requirement.

Make sure that the setting value of limit stroke or dead band are not too small.

Make sure that the pneumatic connections of the positioner and actuator are not leaking.

7. Attention

1. The power supply voltage of the positioner is 24V DC $\pm 10\%$. Please check the power supply before connecting the power cable to the electrical terminal. Make sure that the power supply is cut off before connecting the power cable. If the product is damaged by high voltage, it will lose warranty.

2. Air supply use specification

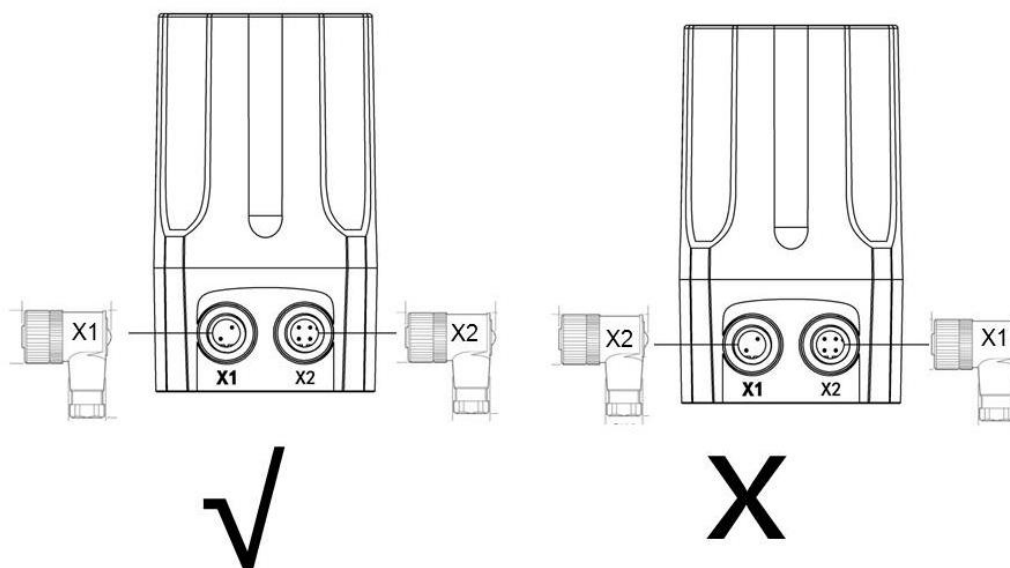
1> The air pressure should be less than 0.7MPa.

2> Install the filter pressure reducer (5 μ m filtration accuracy) in front of the air supply inlet of the positioner to prevent moisture or oil from infiltrating. In the situation of much oil in the air, it is suggested to additionally install oil separator (3 μ m filtration accuracy) in front of the air supply inlet of the positioner. It is suggested to use the combination of SMC brand filter pressure reducer and SMC brand oil separator. Its model is AC20D-01CG-A. If the product is damaged due to the oil entering the product without oil

separator or filter pressure reducer being installed, it will lose warranty.

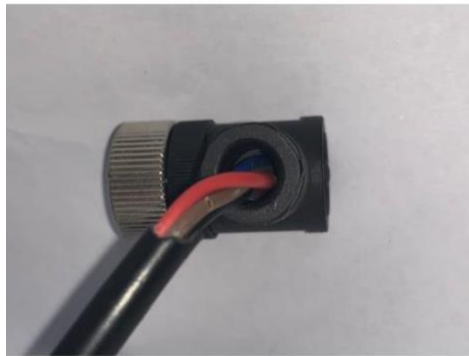
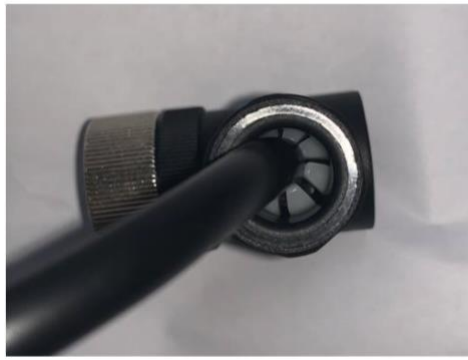
3. Waterproof electrical connectors use specification

- 1> The electrical connectors have foolproof design. Please connect the electrical female connector with the electrical male connector of the positioner according to the sign X1 and sign X2. Error connecting by strong force will destroy the electrical male connector.

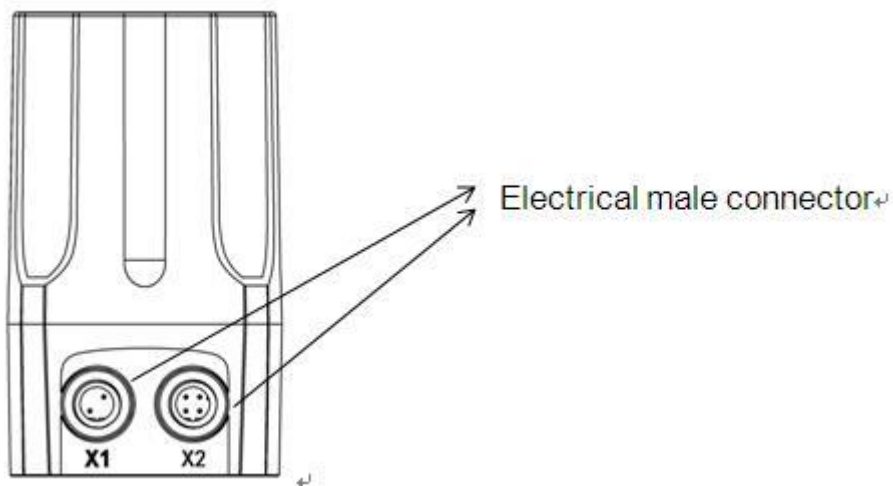


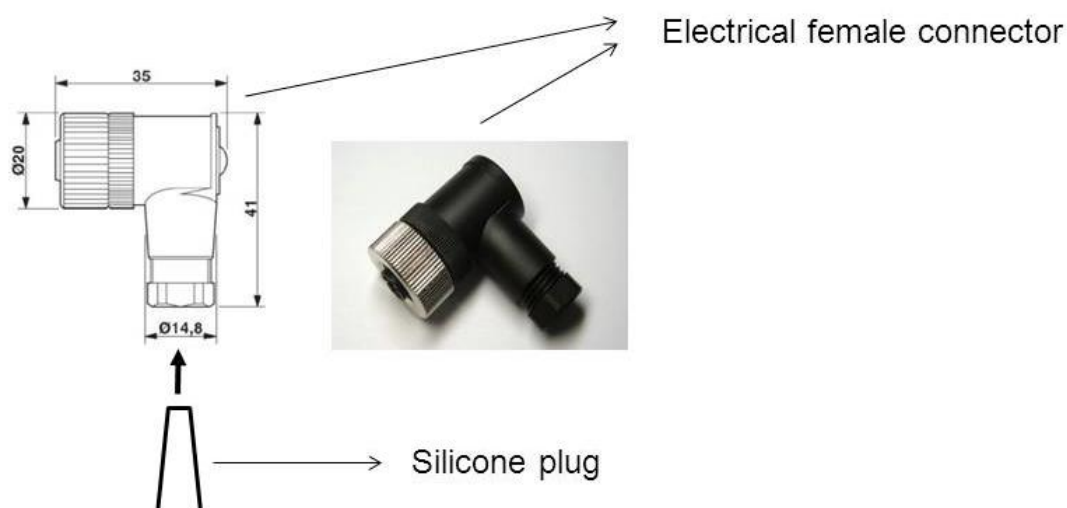
- 2> The cable diameter which is compatible with the waterproof electrical connectors is PG7 (4mm-6mm). Please use the multi - core cable with external insulation protection skin, otherwise the electrical connectors cannot achieve IP66 protection class.

Correct and error wiring ways are showing in the following pictures.



- 3> If the electrical male connectors are not used for a long time, to prevent water vapor or corrosive gases corroding the connector pins or entering the positioner inside, please screw on the electrical female connectors and block another side of the electrical female connectors with the silicone plugs. As shown below.





If the product is damaged by error operations for the waterproof electrical connectors, it will lose warranty.

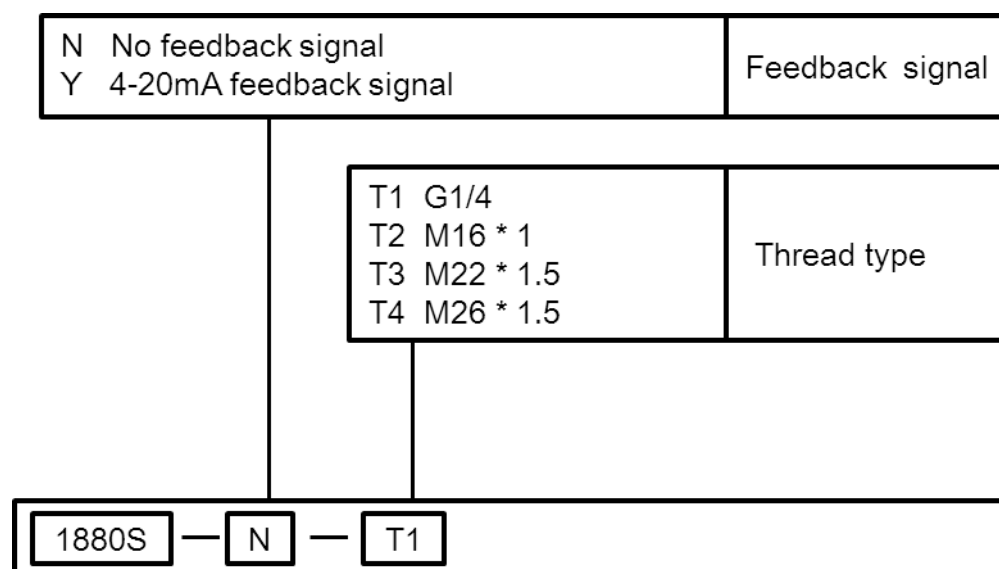
4. If the product is damaged by the user removing the pneumatic connectors or the filter elements near the pneumatic connectors, it will lose warranty.

8. Warranty terms

1. If the product is found to have quality problems which are confirmed by our company staff, customers have after-sale services for product maintenance or free replacement in the warranty period. Service response time is 24 hours (excluding non-working days).
2. The warranty period of the product is based on the company's latest warranty policy, which is no less than 12 months after the sale.
3. The following situations for repaired product do not belong to the warranty range:
 - (1) The date is not in the warranty period.
 - (2) The product is disassembled without authorization and permit by the product company.
 - (3) The damage causes from the operation which is not according to the product instruction manual or other human factors. Including but not limited to:

- 1> The product surface has collision scars.
 - 2> Error wiring or error power supply makes the product damaged.
 - 3> Parts and accessories are lost.
 - 4> The product is damaged due to the oil entering the product without oil separator or filter pressure reducer being installed.
 - 5> Error using the waterproof electrical connectors makes the product damaged.
- (4) Force majeure (natural disasters) causes product failure or damage.
- 4. According to the actual situation, the product company offers the free or fee-based maintenance services outside the warranty range.
 - 5. The terms become effective since the two sides signed a supply contract.

9. Selection and ordering data



Remark:

The product is only used for single-acting line stroke actuator. Power off state is Safe.

It is suggested to match the actuator of 40-100 mm internal gas chamber diameter.

V251127

The changed contents of this manual are not noticed.

The Company reserves the final interpretation for related technical updating.

Attachment

Air Supply Requirements for Intelligent Valve Positioner

All Series Products

In accordance with technical specifications, all series of intelligent valve positioners require Class 3 quality compressed air supply. Supplying compressed air that meets the air source standards ensures stable normal operation of the positioners.

Class 3 Dew Point: Dew point shall be -20°C . (If the actual operating ambient temperature of the positioner is lower than -20°C , the dew point of the supplied compressed air shall be 10°C lower than the actual operating ambient temperature of the positioner accordingly.)

Class 3 Solid Particle Size & concentration: 5.0 mg/m^3 (corresponding particle size: $5.0\text{ }\mu\text{m}$). Particles larger than $5.0\text{ }\mu\text{m}$ are prohibited from entering the equipment.

Class 3 Oil Content: 1.0 mg/m^3 , the cumulative oil content per cubic meter of air shall not exceed 1.0 mg .

Process Example

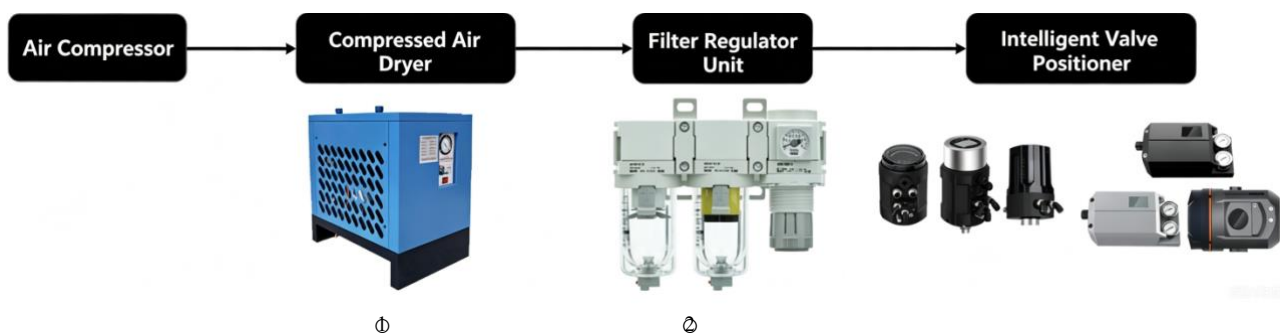


Figure 1. Process Flow Diagram

- ① Install a compressed air dryer on the main pipeline to remove most moisture contained in compressed air; the pressure dew point after filtration can reach -20°C .
- ② Select one of the air preparation assemblies shown in Figure 2 and install it upstream of the positioner. Depending on the selected configuration, install the filter regulator or air filter upstream, followed by the mist separator downstream. The filtration system shall remove particles larger than $5.0\text{ }\mu\text{m}$ and reduce the residual oil concentration to no more than 1.0 mg/m^3 .

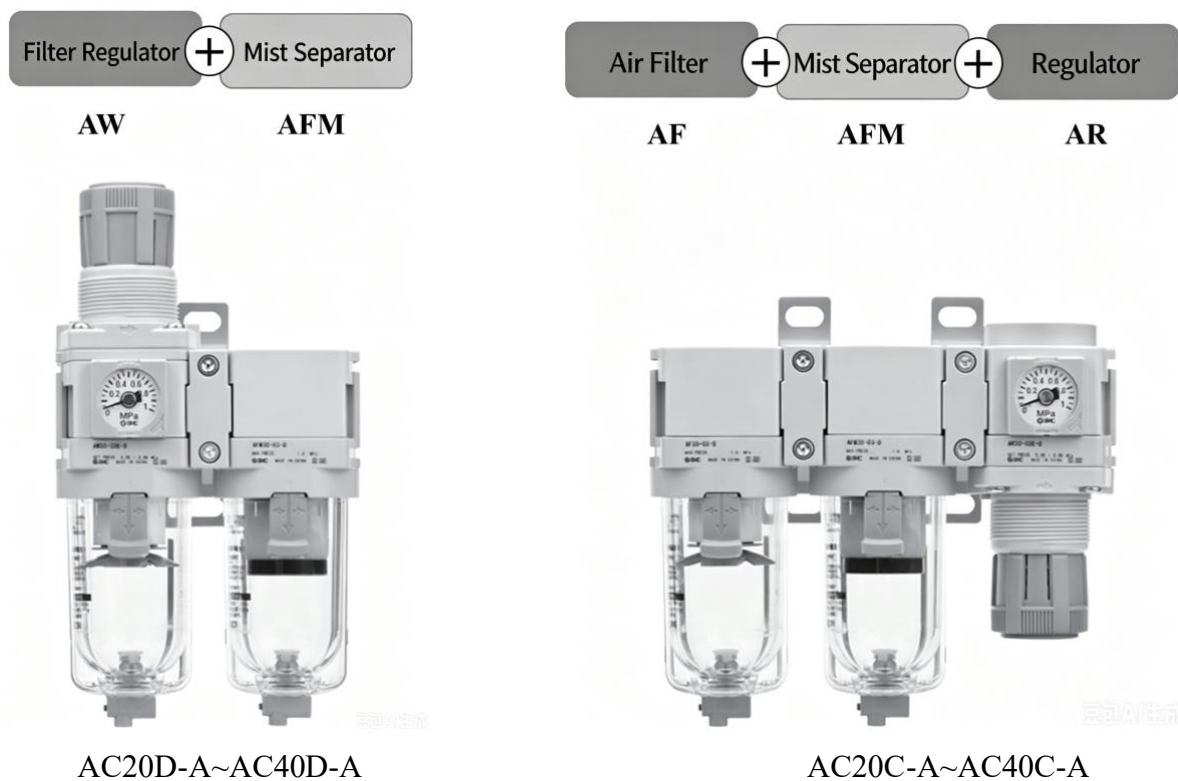


Figure 2. Filter Regulator Assembly

Filter Regulator Selection Recommendations

Selection Combination	Air Filter + Mist Separator + Regulator AF AFM AR 		Filter Regulator + Mist Separator AW AFM 
	AC 30 C - [] 03 DG - [] - [] - A 1 2 3 4 5 6	AC 30 D - [] 03 DG - [] - [] - A 1 2 3 4 5 6	
Selection Model No.	SMC AC20C-02G-A		SMC AC20D-02G-A SMC AC30D-02G-A
	When the quality of compressed air at the inlet side is slightly lower than the operating requirements of the positioner		When the compressed air quality at the inlet meets the operating requirements of the positioner

Basic Parameters	Fluid: Air Ambient & Operating Temperature: -5~60°C (no freezing) Proof Pressure: 1.5 MPa Operating Pressure Range: 0.05~1.0 MPa Adjustable Pressure Range: 0.05~0.7 MPa Filtration Rating: AW: 5 µm, AFM: 0.3 µm (99.9% collection efficiency) Bowl Material: Polycarbonate Structure: Relieving type		
Selection Parameters	① Main Body Size: 20 Rated Flow Rate: 200 L/min Bowl Guard: Standard (Steel Band) Weight: 0.39 kg ② Thread Type (No Mark): Rc ③ Port Size Code 02: 1/4 ④ No Mark: Manual Drain Pressure Gauge G: Round Pressure Gauge with Limit Indicator ⑤ No Mark: No Accessories ⑥ No Mark: No Special Options	① Main Body Size: 20 Rated Flow Rate: 150 L/min Bowl Guard: Standard (Steel Band) Weight: 0.33 kg ③ Thread Type (No Mark): Rc ④ Port Size Code 02: 1/4 ⑤ No Mark: Manual Drain Pressure Gauge G: Round pressure gauge with limit indicator ⑥ No Mark: No accessories ⑥ No Mark: No special options	① Main Body Size: 30 Rated Flow Rate: 330 L/min Bowl Guard: Standard Equipment (Polycarbonate) Weight: 0.66 kg
1 Series Positioner*	●	●	/
IP Series Positioner*	●	/	●

*●Recommended selection

Note: The rated air handling flow rate of the filter shall be higher than the maximum operating flow rate of the positioner. If multiple positioners are installed on the same air supply line, the total maximum operating flow rate shall be the sum of each unit. (1 Series Max Flow: 1500 / 1600: Q1-17 L/min, Q2-95 L/min 1880S: 17 L/min IP Series Max Flow: IP5500: 155 L/min IP6000 / IP6500: 187 L/min IP6000d: 150 L/min All above data are measured under 0.6 MPa supply pressure.)

Important Notes

1. Select filter regulators with suitable performance based on site working conditions to avoid equipment failure caused by high temperature, low temperature, high pressure, corrosive atmosphere and other harsh environments. Refer to the selection table at the end of this appendix.
2. Regularly inspect the condition and performance of the filter. Increase inspection frequency under high-frequency operating conditions to prevent malfunctions caused by clogged filter elements. (Typical failures include: ① Loss of filtration performance, allowing foreign matter to enter and damage the positioner; ② Clogging of the filter elements, resulting in an abnormal air supply and preventing the positioner from operating normally.)
3. For filter regulators with an auto-drain function, blockage of drain holes shall be prevented. Regular inspections can avert excessive water accumulation in the filter bowl caused by filter malfunctions. Manually drained filter regulators shall be drained manually on a regular schedule according to the water accumulation rate under actual working conditions.
4. Carry out regular maintenance or replace any nonconforming filter/regulator units in accordance with the operating instructions of the filter regulator to avoid unnecessary failures.