Intelligent Valve Positioner

1600 Series User's Manual

智能阀门定位器

1600 系列用户手册

Contents

1 Overview

1.1. Product structure

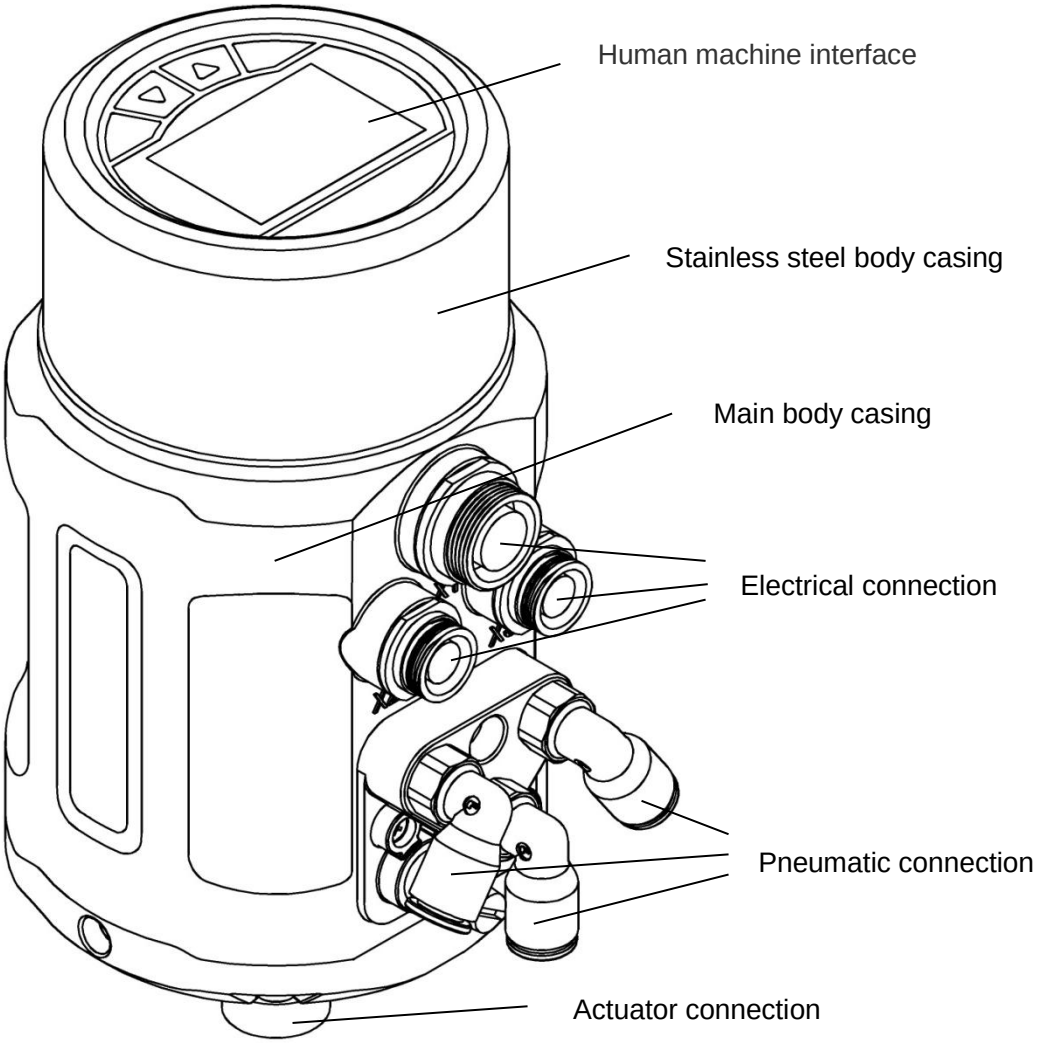


Figure 1. Positioner structure

1.2. Product description and application

1600 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

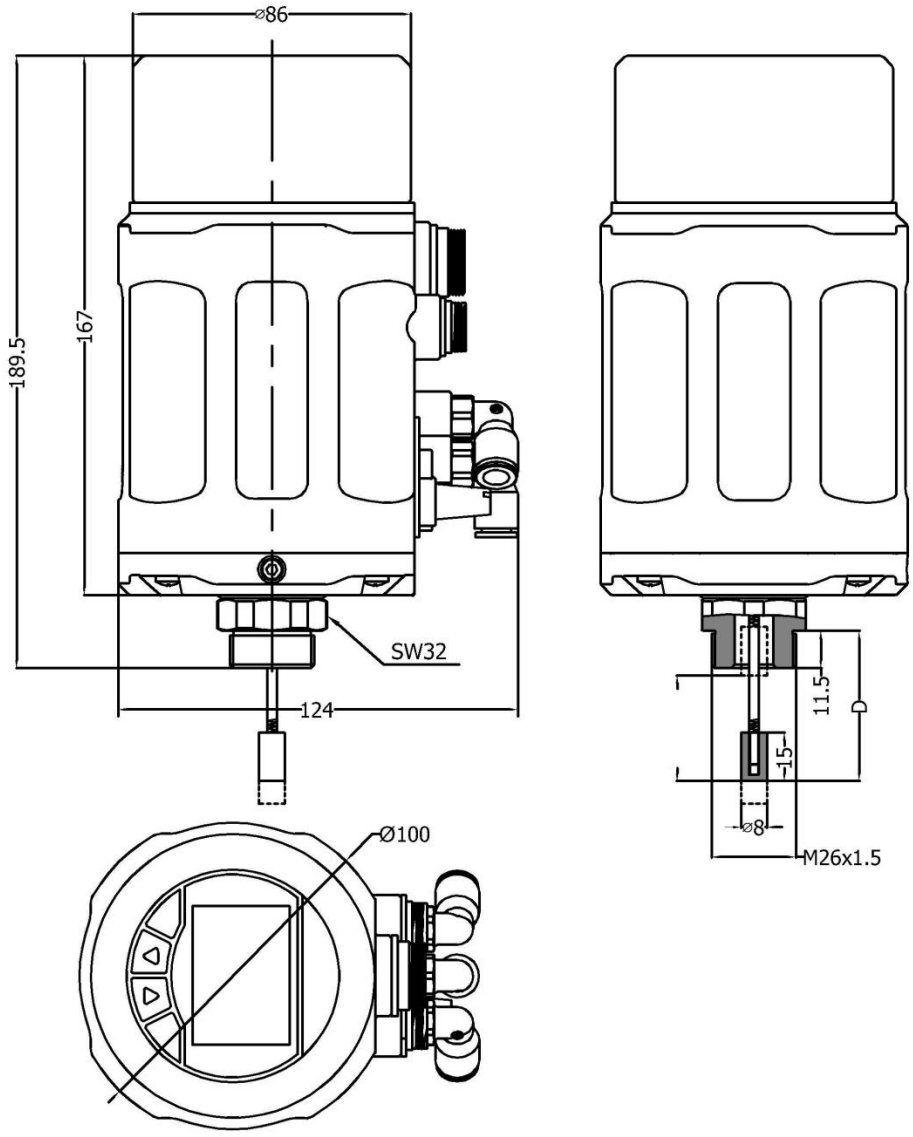


Figure 3. Mechanical dimensions for line stroke

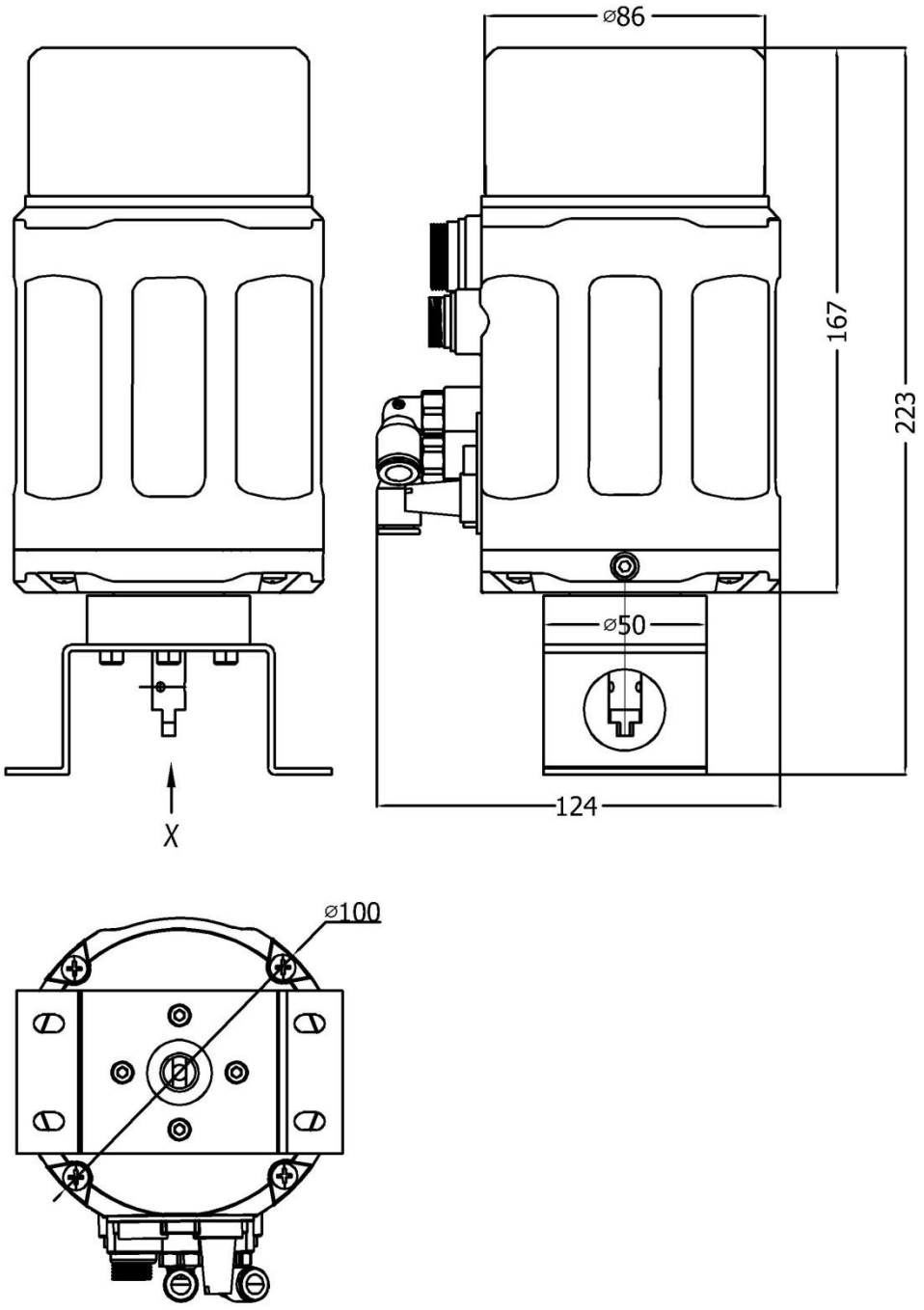


Figure 4. Mechanical dimensions for angle stroke

2.2. Actuator combination

2.2.1. Actuator of line stroke

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 5.

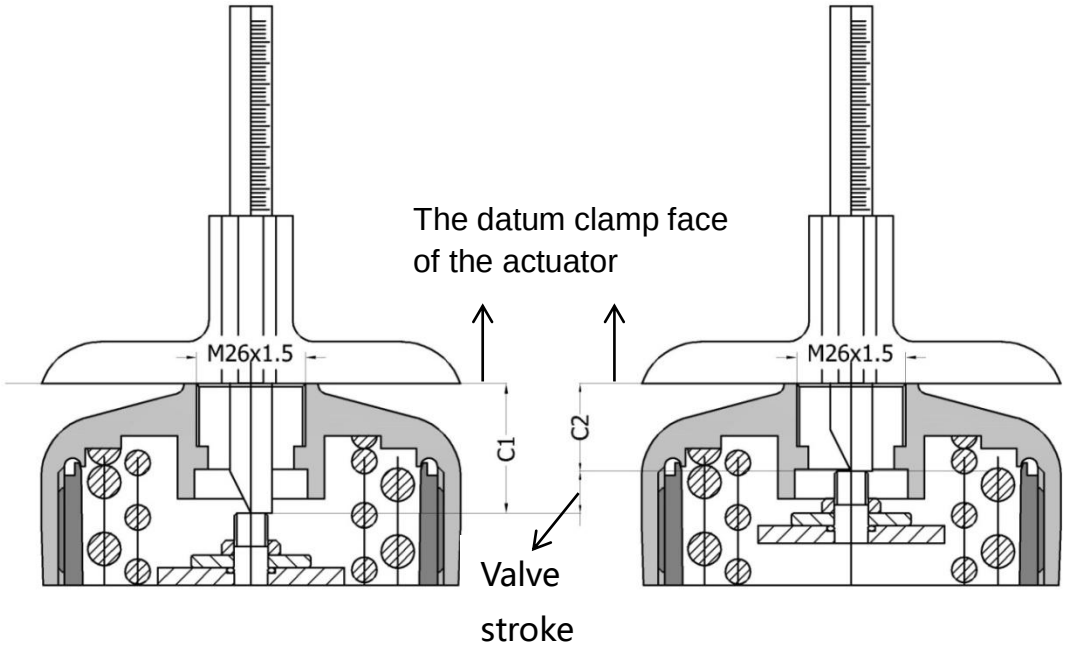


Figure 5. Actuator measurement

3. Adjust the adjusting nut of the displacement sensor. Then measure the D value (as shown in Figure 6) 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 ＜ 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
25~50 mm	65~71 mm	3.5~53.5 mm

Table 1. The reference range of the compression value

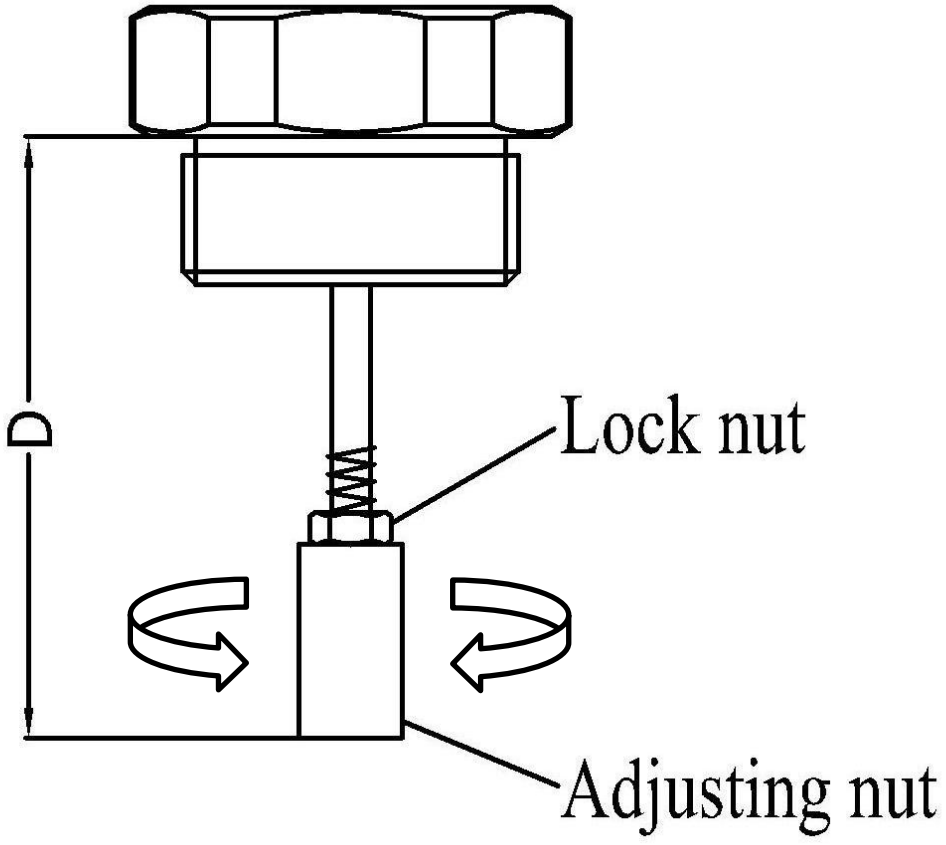


Figure 6. Travel sensor adjustment and measurement

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 7.

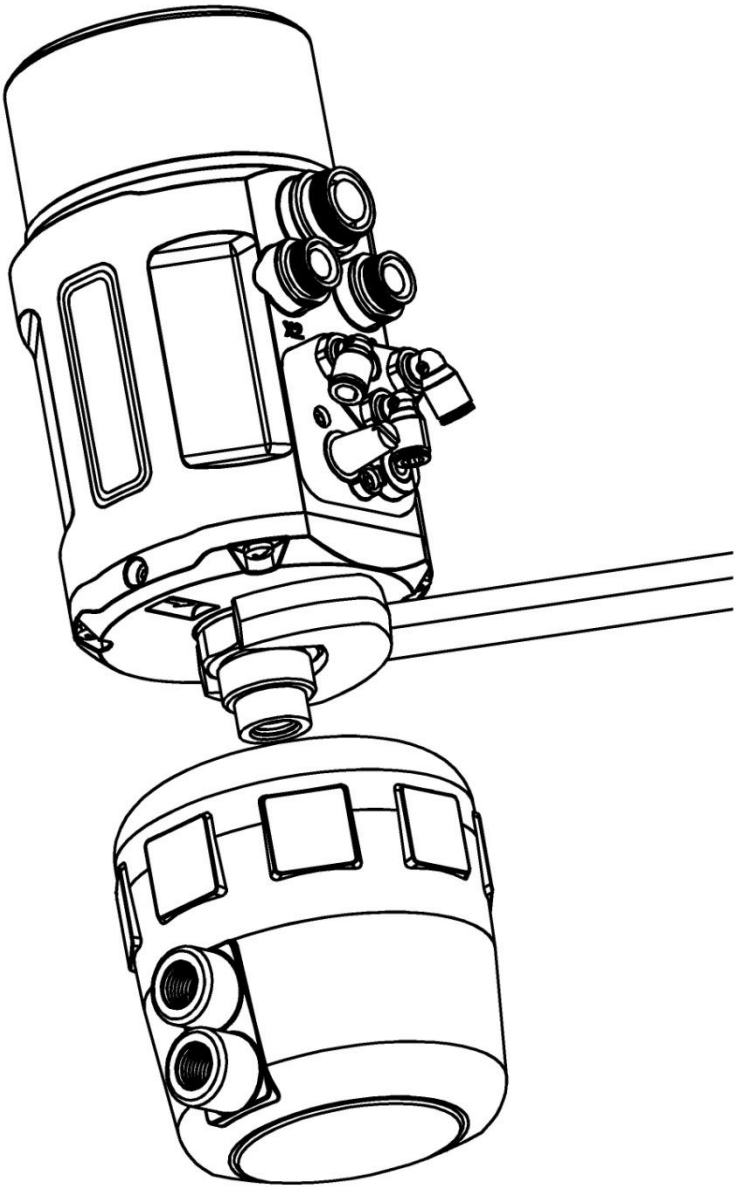


Figure 7. Actuator Combination

2.2.2. Actuator of angle stroke

1. Fix the mounting body under the positioner. As shown in Figure 8.
2. Connect the feedback pole of the positioner with the axis of the actuator. As shown in Figure 8.

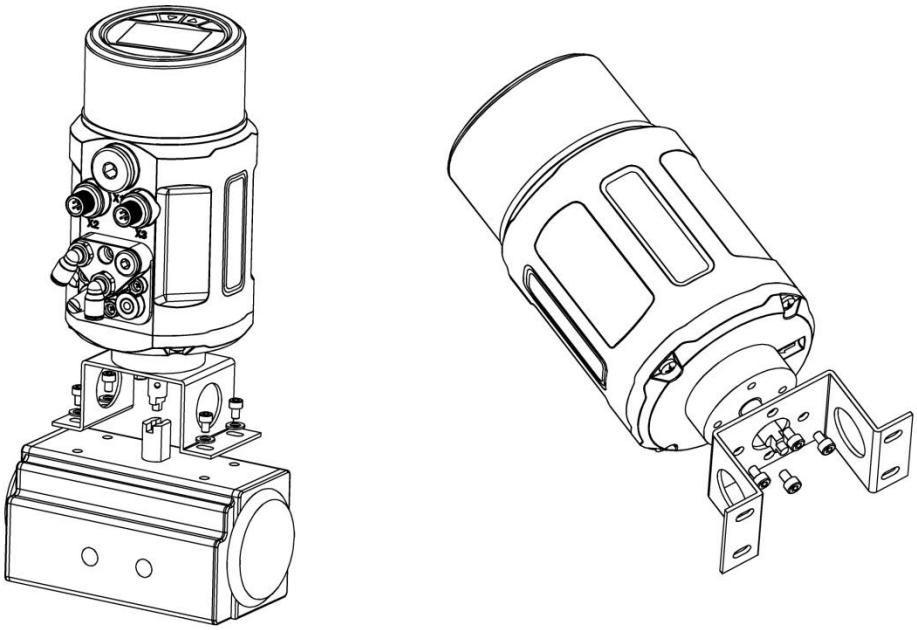
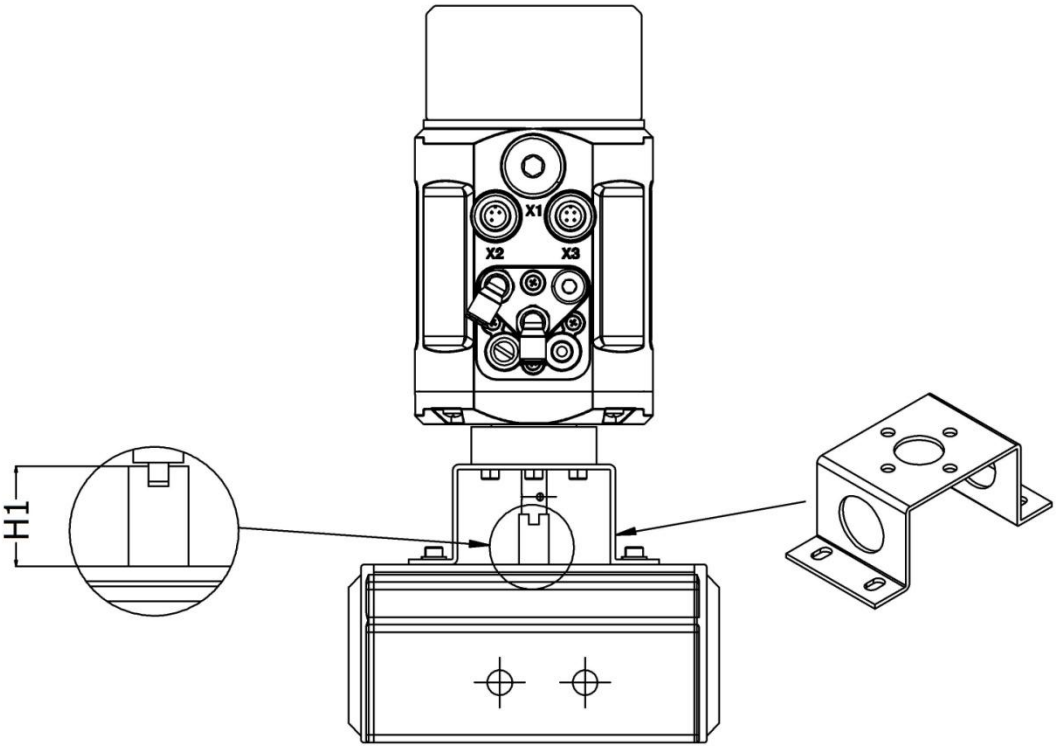
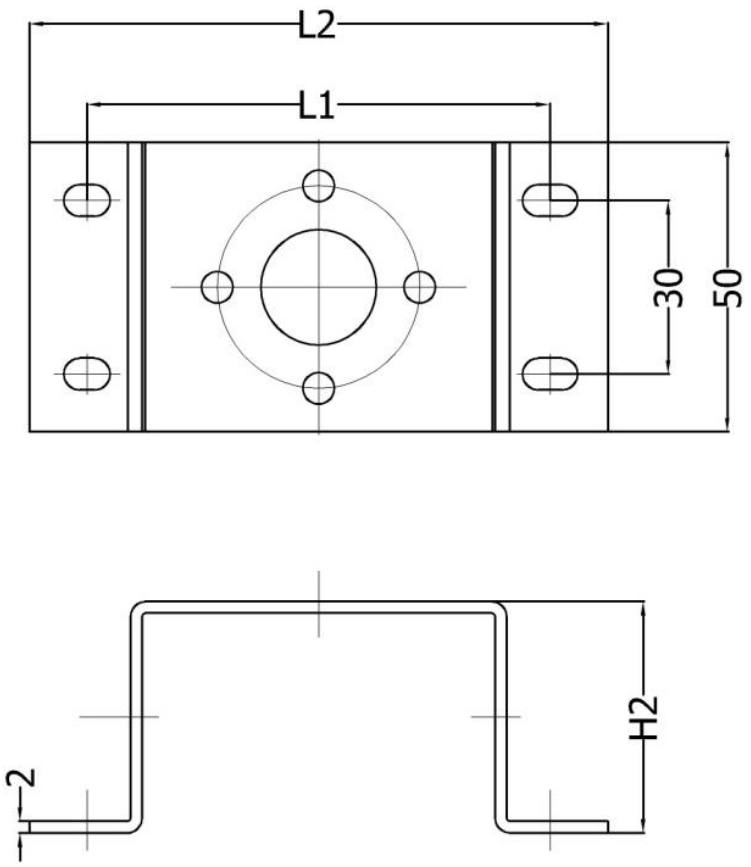


Figure 8. Graph Installation





Type	H1	H2	L1	L2
PF-1(Default)	20	40	80	100
PF-2	30	50	80/130	100/150

Figure 9. Mechanical dimensions of the mounting body

2.3. Interface angle adjustment

If you need to adjust the interface angle, relax the hexagon screw in place A (As shown in Figure 10) first. Then adjust the angle clockwise or counter-clockwise in 180°range. After adjusting the angle, lock the angle by the hexagon screw.

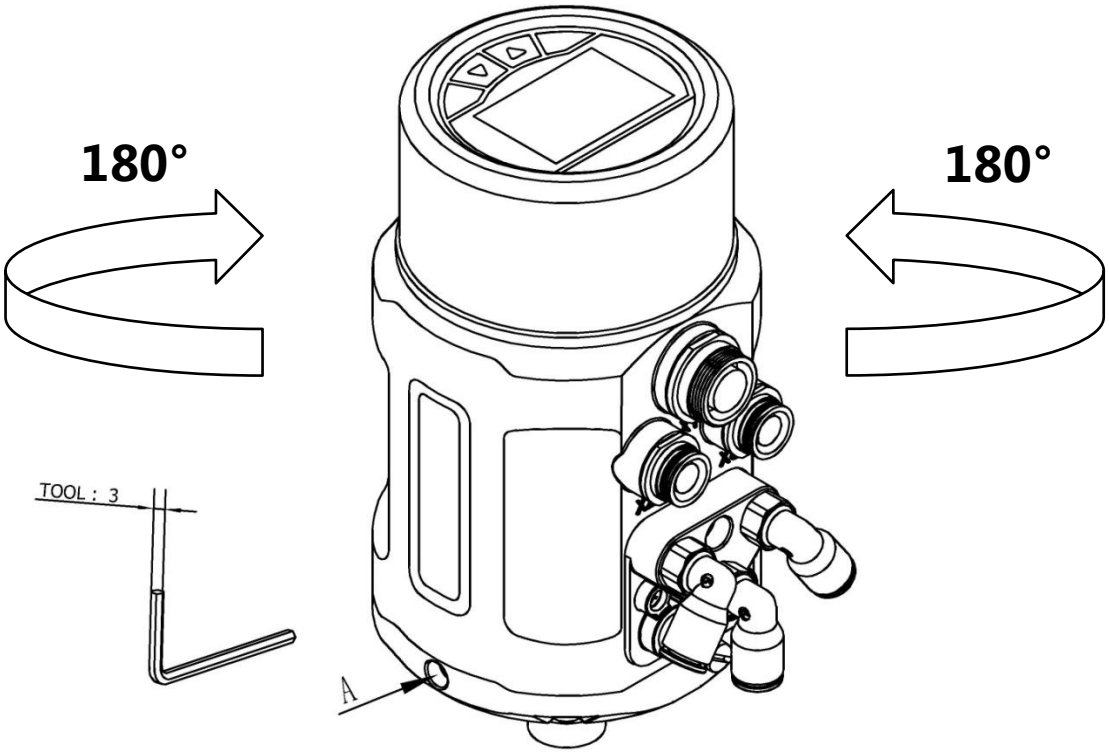


Figure 10. Graph operation

NOTE！

The positioner has rotation stopper mechanism. If it is restricted to rotate in one direction, please do not force to rotate continuously.

3. Connection description

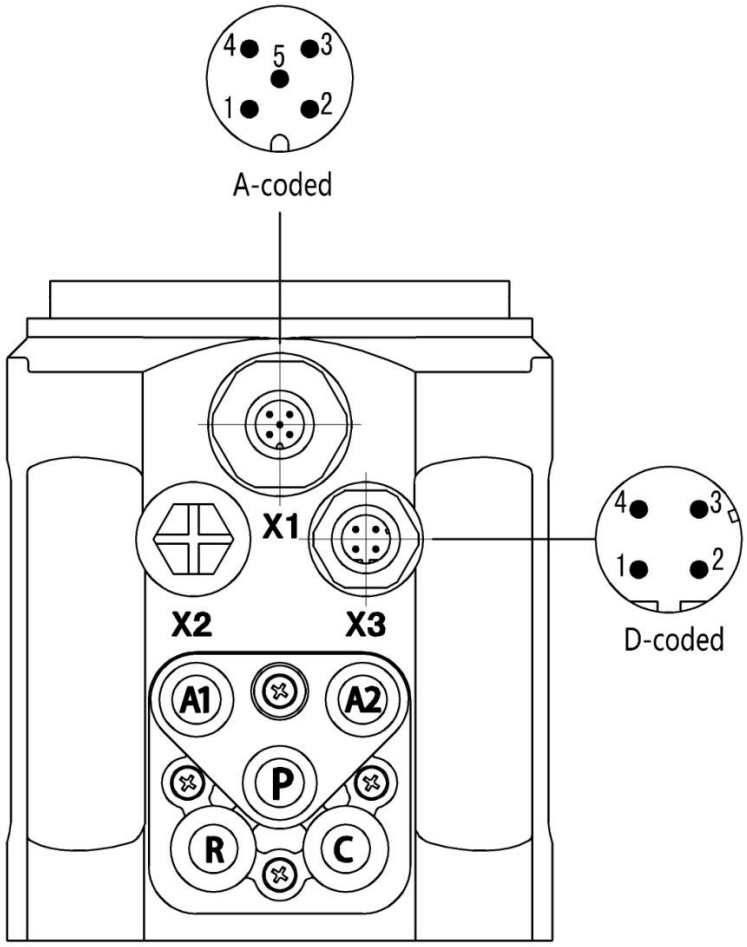


Figure 11. Connection

Connection	Pin	Description	Signal Type
X1	1	Analogue signal output +	0/4 – 20 mA or 0 – 5/10 V
	2	Binary signal output 1	0/24 V
	3	Binary signal output 2	0/24 V
	4	Binary signal input +	0-3V =“0”, 15-30V =“1”
	5	Signal common GND	GND

Table 2. Electrical connection description – X1

Connection	Pin	Description	Signal Type
X3	1	Power supply +	+24 V
	2	Power supply GND	GND
	3	Set signal input +	0/4 – 20 mA or 0 – 5/10 V
	4	Set signal input GND	GND

Table 3. Electrical connection description – X3

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
C	Check valve
A1	Pilot air outlet 1
A2	Pilot air outlet 2

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: 0~55 °C
Protection class: IP66
Vibration resistance parameter: 100Hz

4.2. Electrical data

Connections: cable gland
Supply voltage:
24 V DC ± 10 %, ≥1A. Recommend switching-mode power supply.
Power input: <5W

Input resistance for set-point signal: 140Ω at 0/4-20mA, 20KΩ at 0-5/10V
Input resistance for process signal: 140Ω
Analogue output signal:
maximum load 560Ω at 0/4-20mA, maximum current 10mA at 0-5/10V
Binary output signal maximum current: 50mA
Binary input signal: 0-3V = logic "0", 15-30V = logic"1"

4.3. Mechanical data

Cover material: Polycarbonate (PC), Stainless steel (304)
Sealing material: Silicone rubber (SI)
Main body material: Polyamide Resin (PA6-GF30)
Control stroke range: 5-50 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)
58L/min (input pressure of 0.6Mpa, only single-acting)

5. Operation

5.1. Interface description

The positioner includes a 4-key control panel and a 128x64 dot matrix graphics display. User can switch the display and set parameters and functions by pressing the four keys. The functions of the keys are represented in the 4 lower grey bars on the LCD display panel.

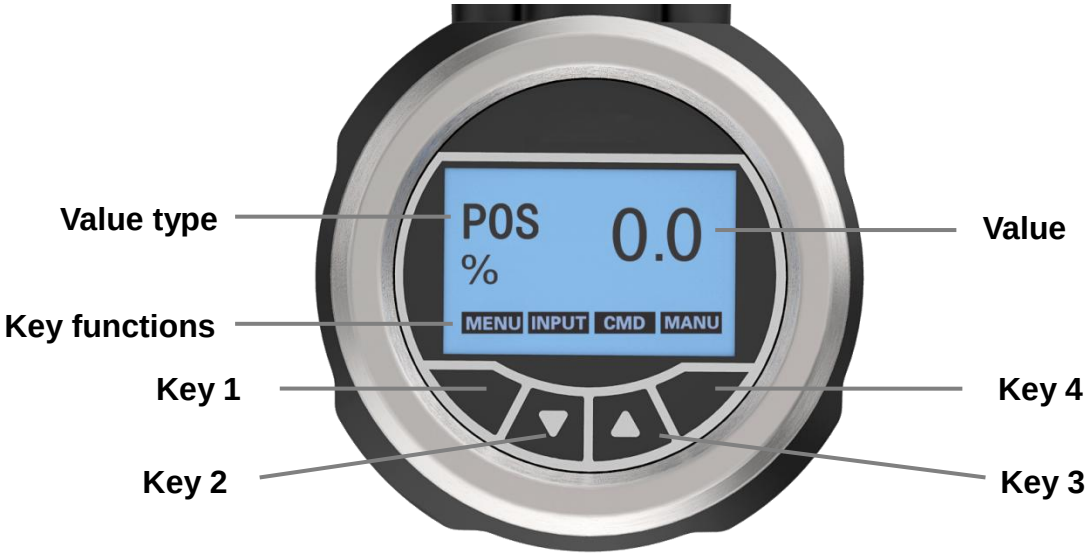


Figure 12. Operating interface

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 descripted 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.

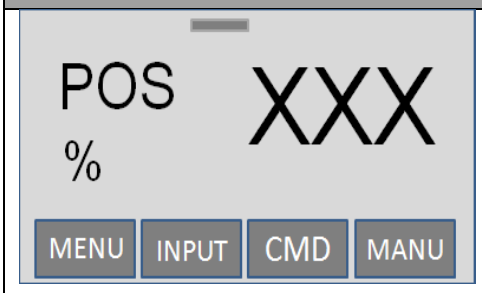
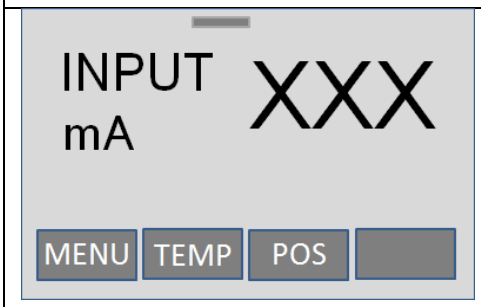
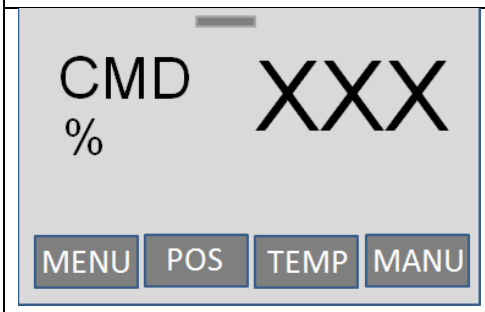
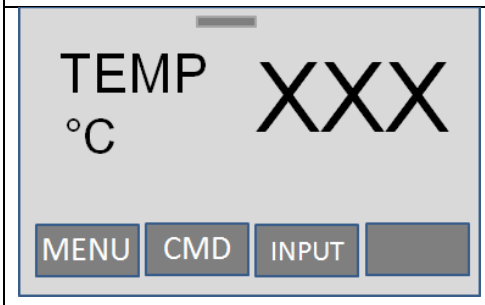
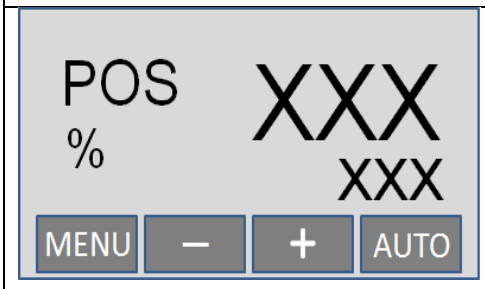
Display	Description
	Current position in the automatic mode. Press "POS" key or "AUTO" key to display.
	The value of input signal in the automatic mode. Press "INPUT" key to display.
	The set-point value in the automatic mode. Press "CMD" key to display.
	The temperature value of internal system. Press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

Table 5. Operating interface

5.3. Main menu

User can operate specific function or set specific parameters under the main menu. The menu interfaces have no lock function. So user should exit to the

operating interface from the main menu after operating specific function or setting specific parameters.

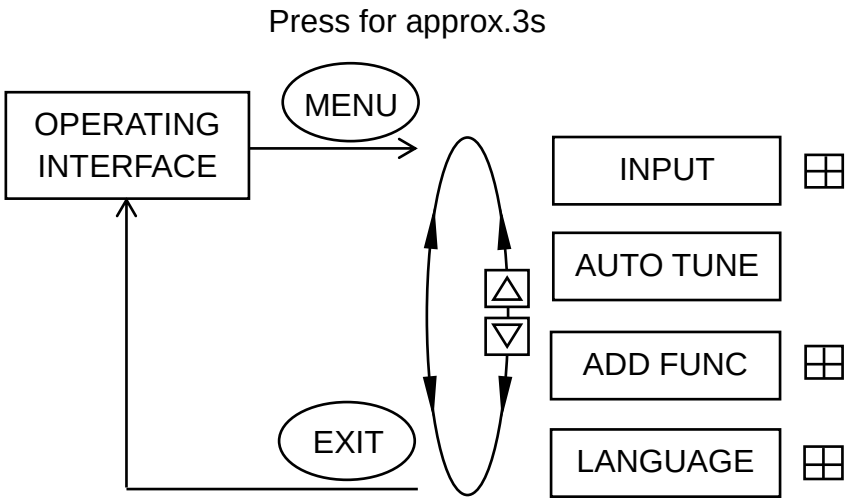


Figure 13. Operating structure main menu

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.

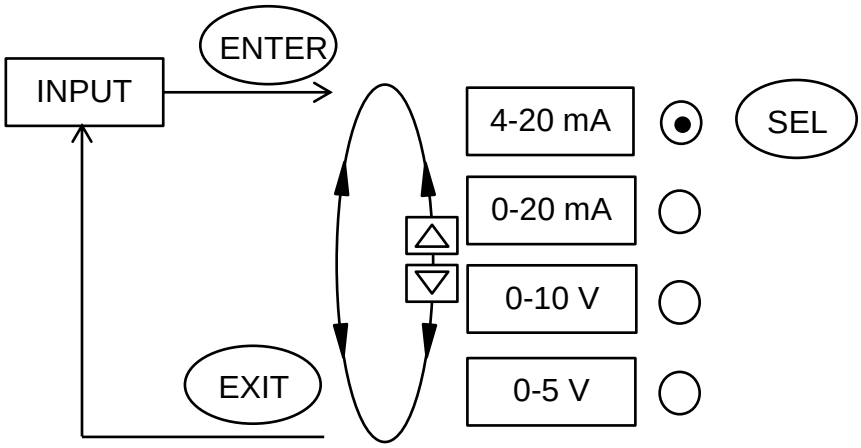


Figure 14. Operating structure INPUT

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, LCD 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, LCD displays "POS MAX ERROR". If LCD displays the error information above, it is need to re-match the positioner and the actuator, refer to Chapter 2 for details.

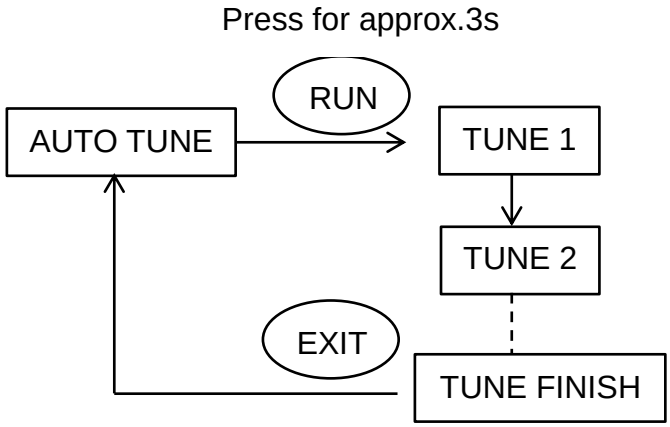


Figure 15. Operating structure AUTO TUNE

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 parameters may be error.

5.3.3. ADD FUNC

The option includes auxiliary functions.

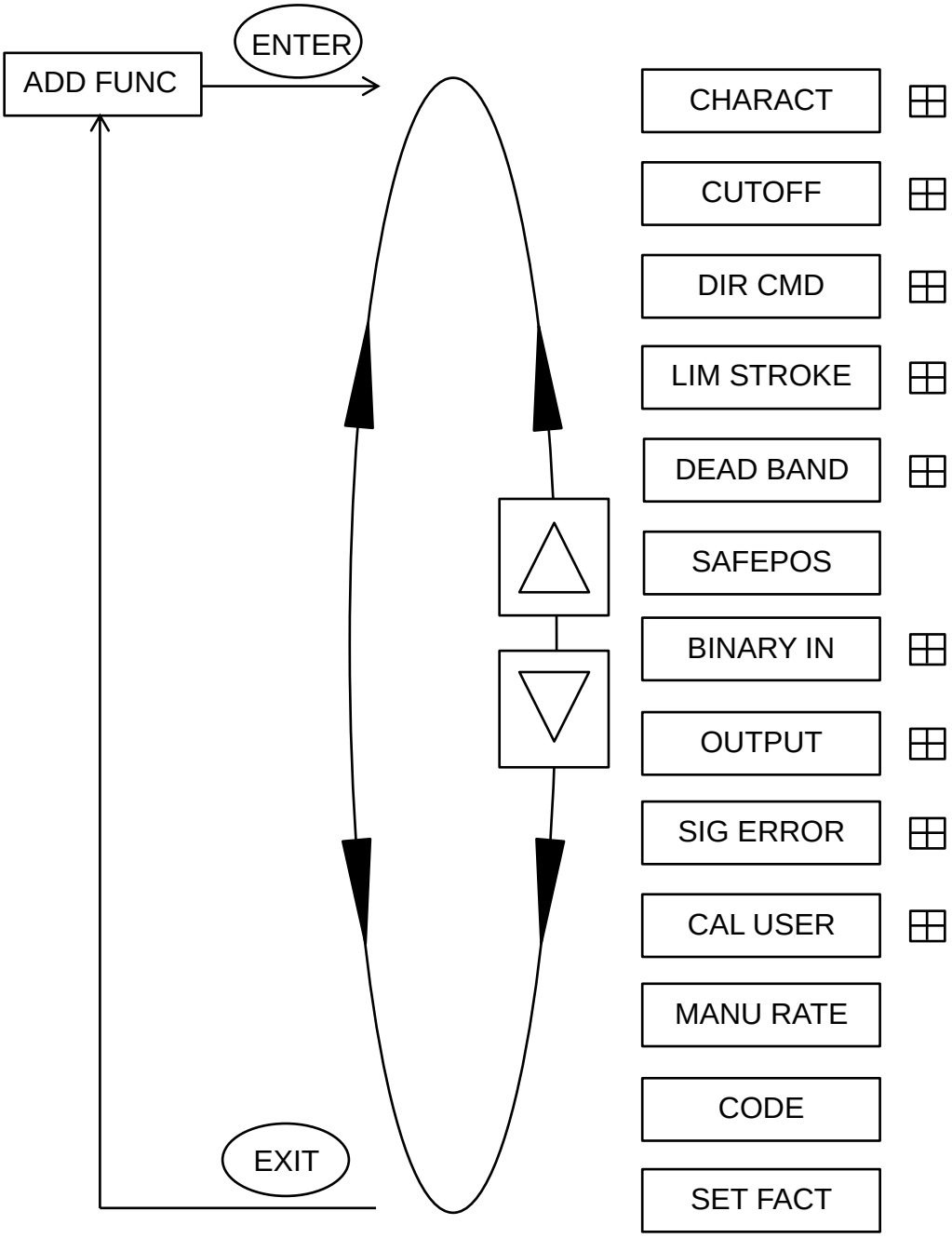


Figure 16. operating structure ADD FUNC

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.

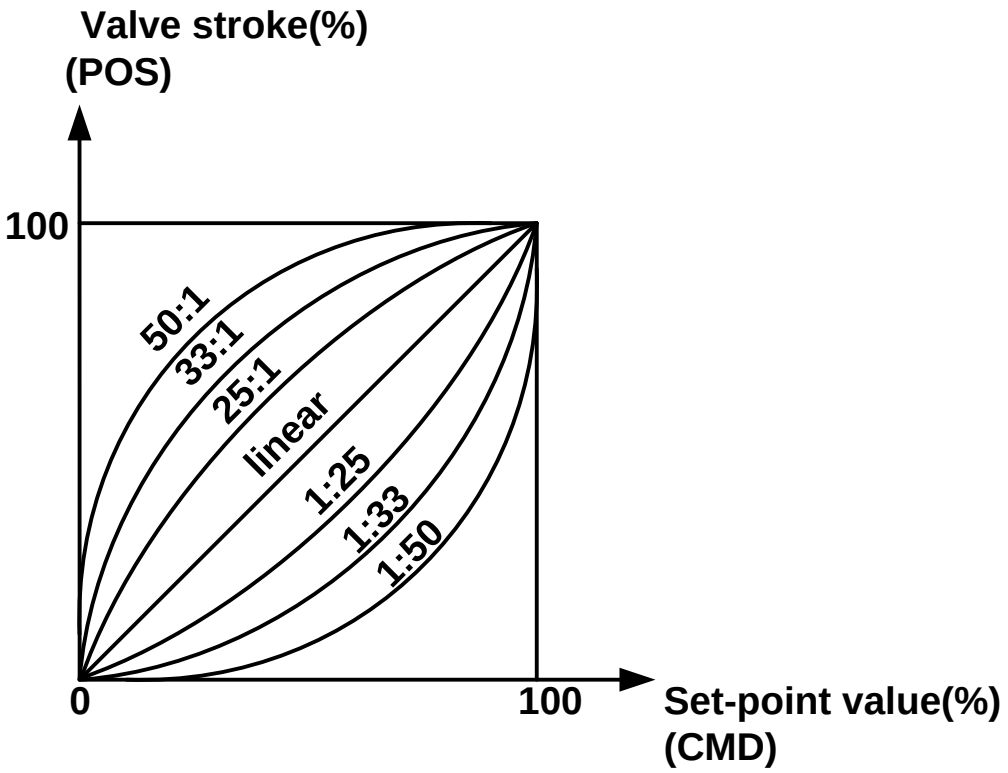


Figure 17. Graph characteristics of linear and equal percentage

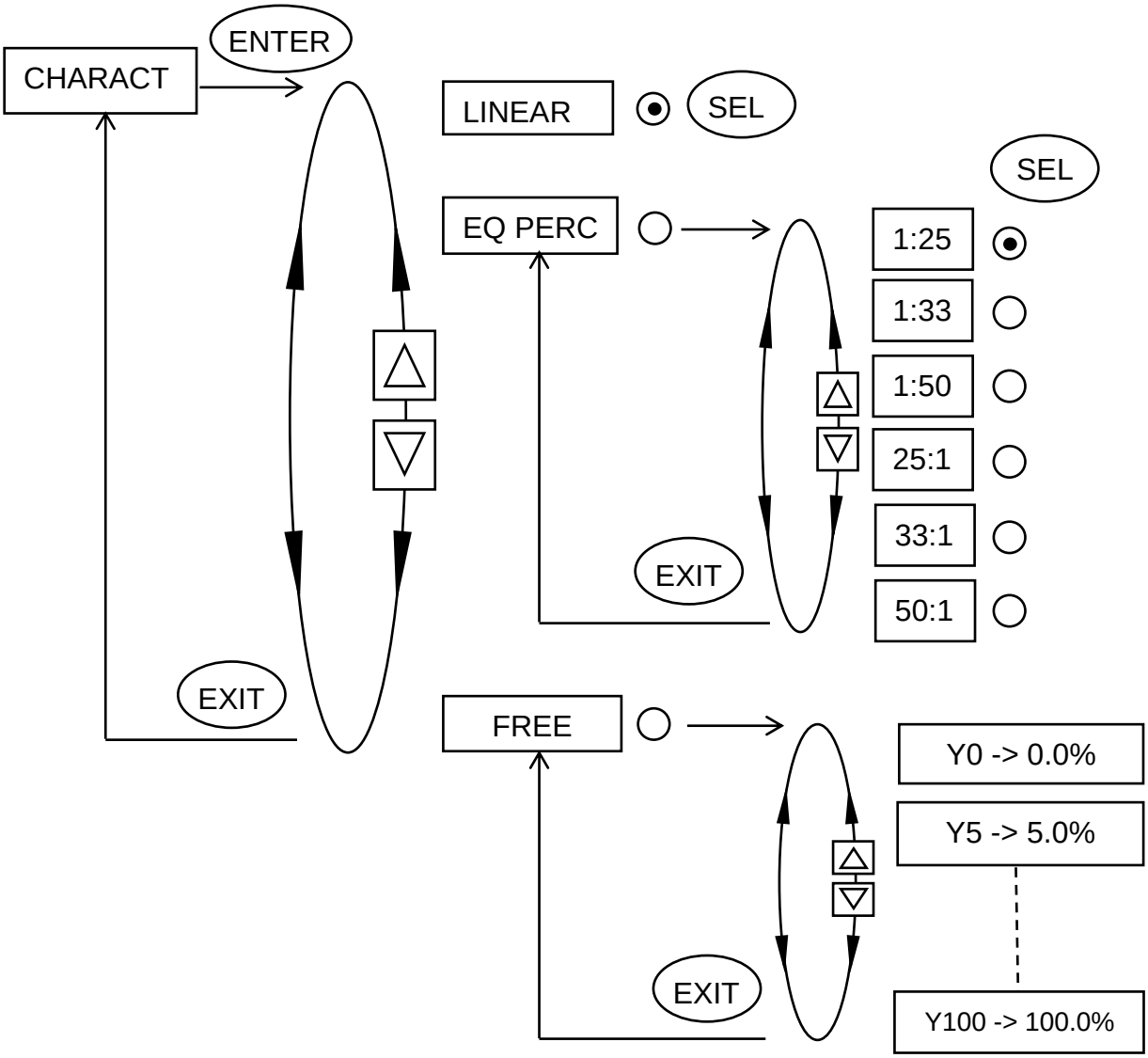


Figure 18. Operating structure CHARACT

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

Equal percentage characteristic

The Equal percentage characteristic includes the options of 1:25, 1:33, 1:50, 25:1(inverse), 33:1(inverse), 50:1(inverse).

Freely programmable characteristic

User can program free characteristic by operating the FREE option.

The position set-point value scale ranging from 0-100 % is divided uniformly into 21 nodes. A freely programmable valve stroke ranging from 0-100 % is assigned to each node.

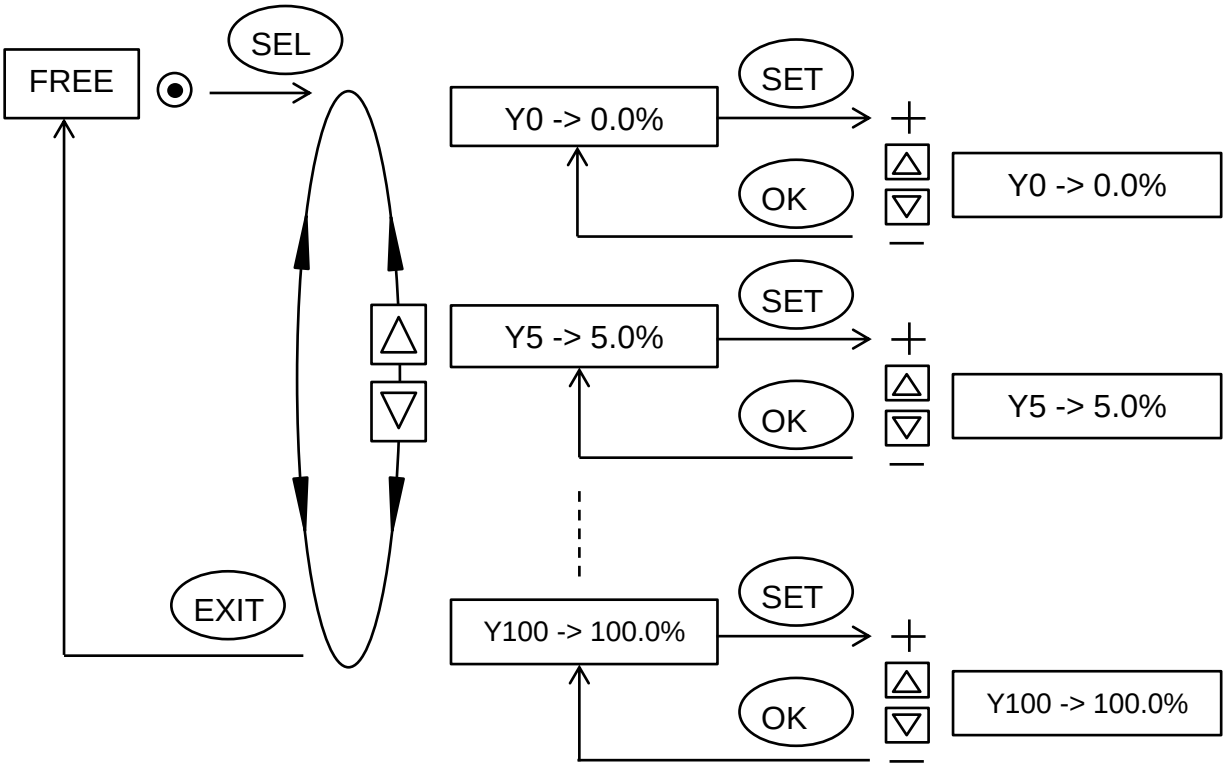


Figure 19. Operating structure CHARACT FREE

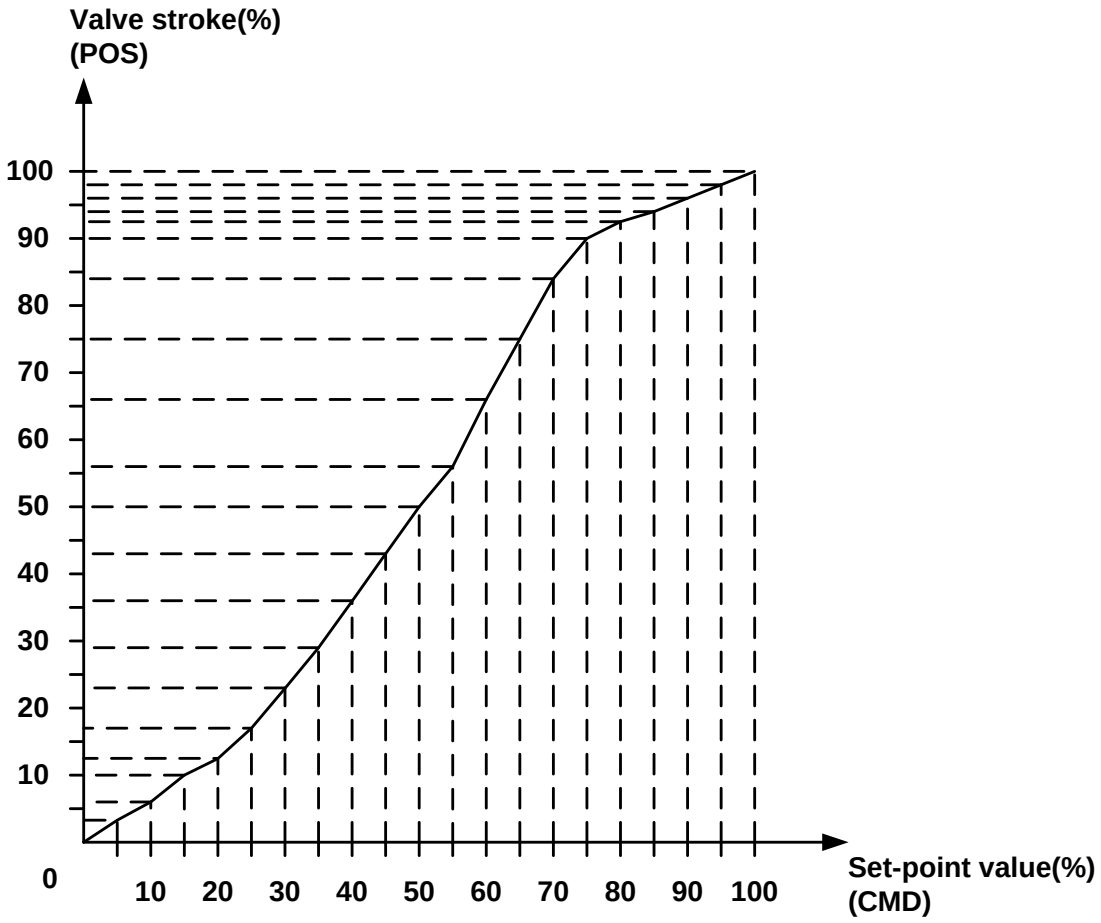


Figure 20. Graph CHARACT FREE

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.

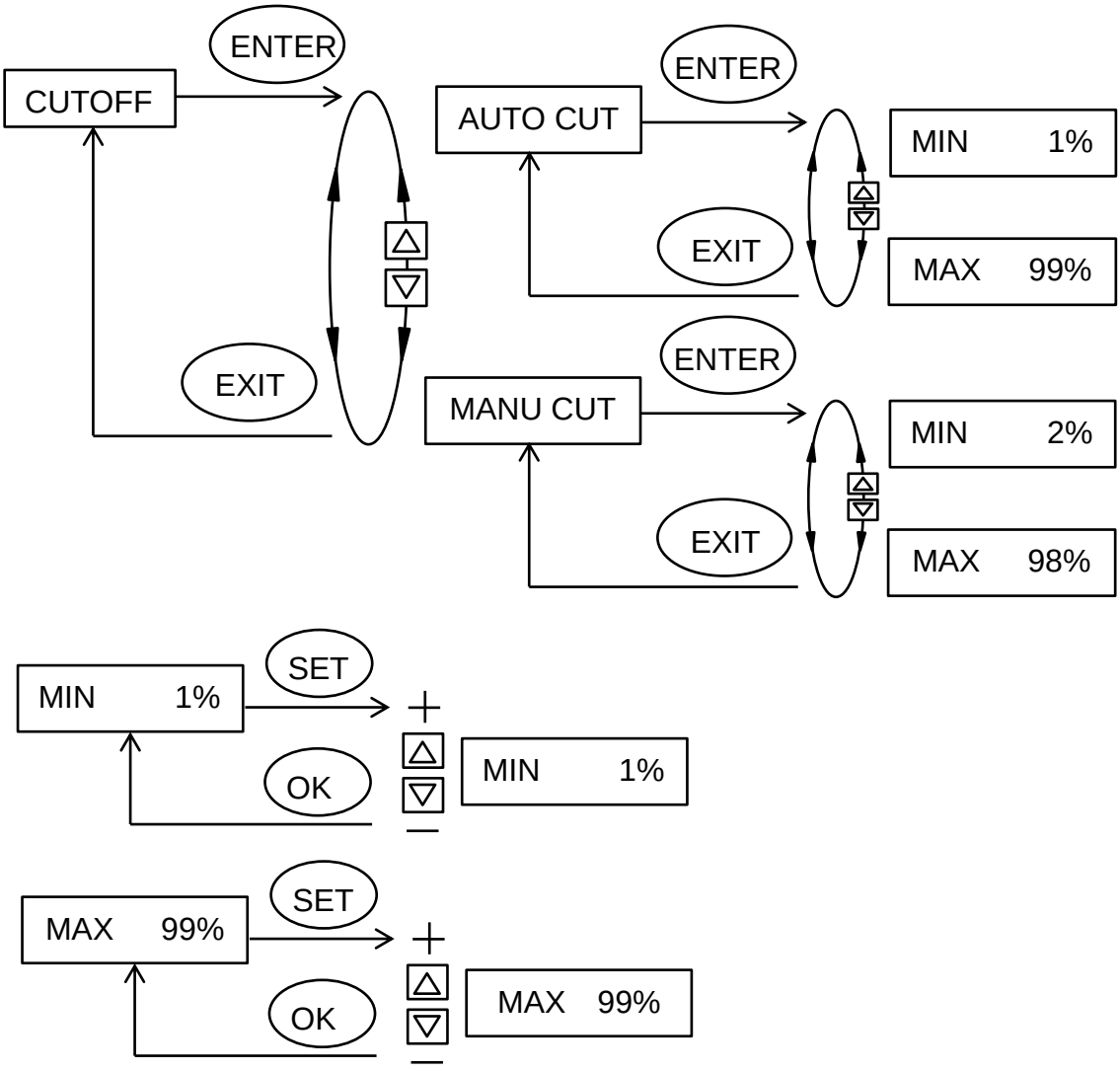


Figure 21. Operating structure CUTOFF

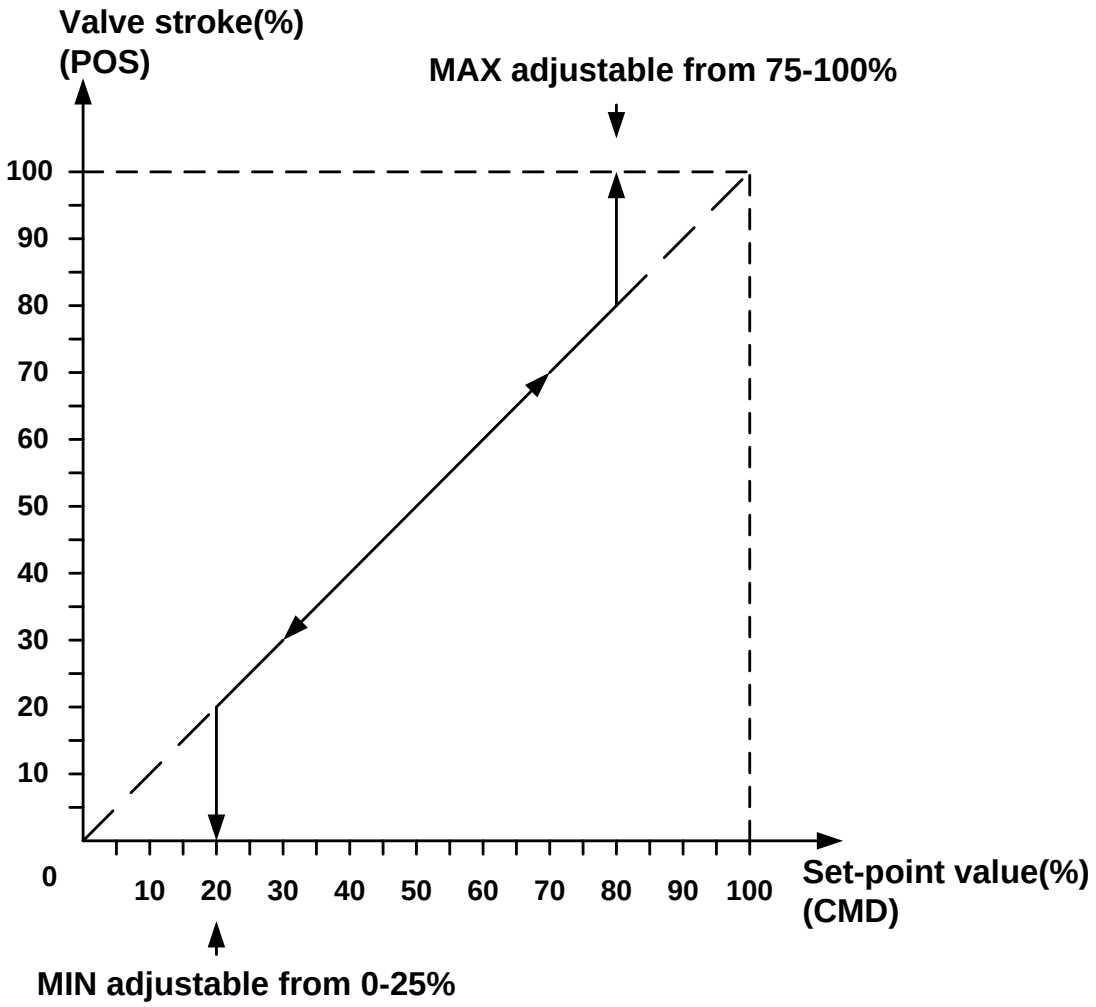


Figure 22. Graph CUTOFF

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 or 0 V → 0%, 20 mA or 5/10 V → 100%.
FALL: 0/4 mA or 0 V → 100%, 20 mA or 5/10 V →0%.

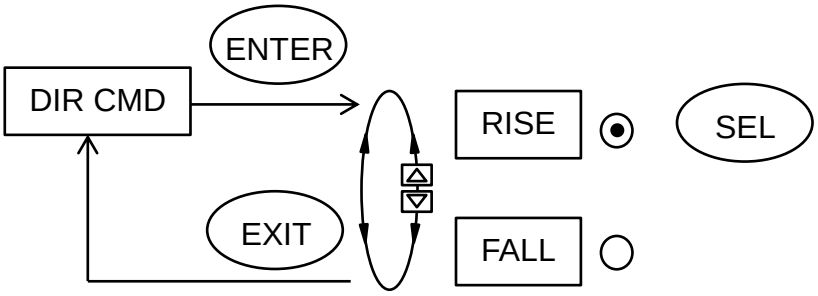


Figure 23. Operating structure DIR CMD

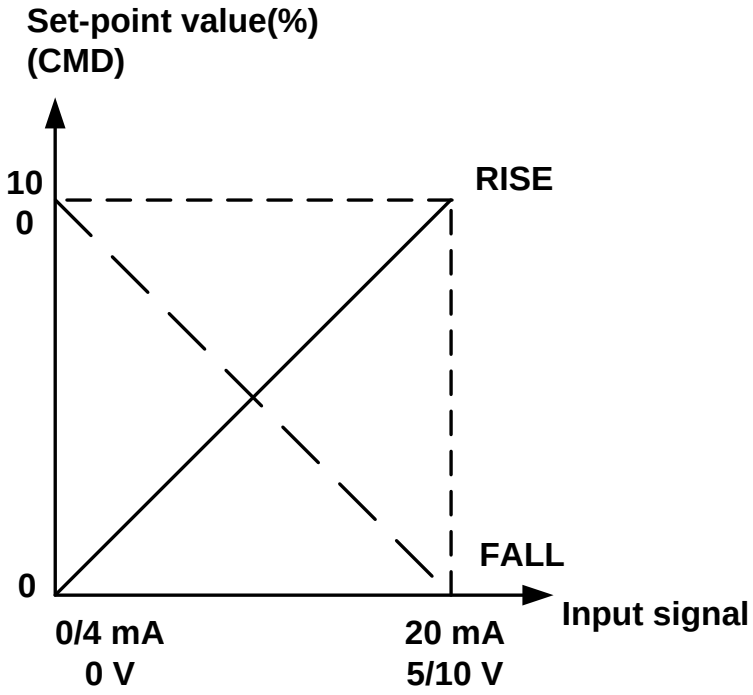


Figure 24. Graph DIR CMD

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.

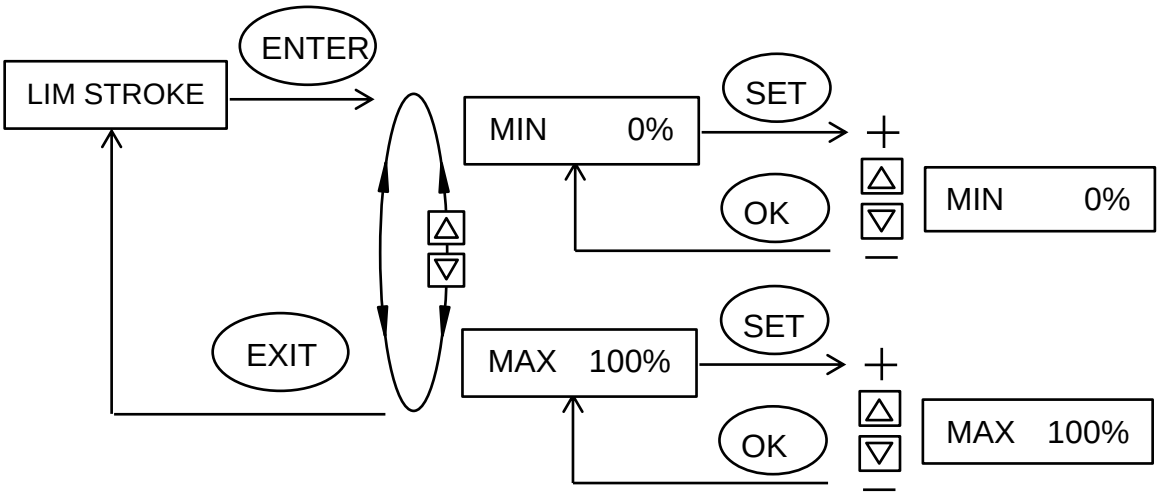


Figure 25. Operating structure LIM STROKE

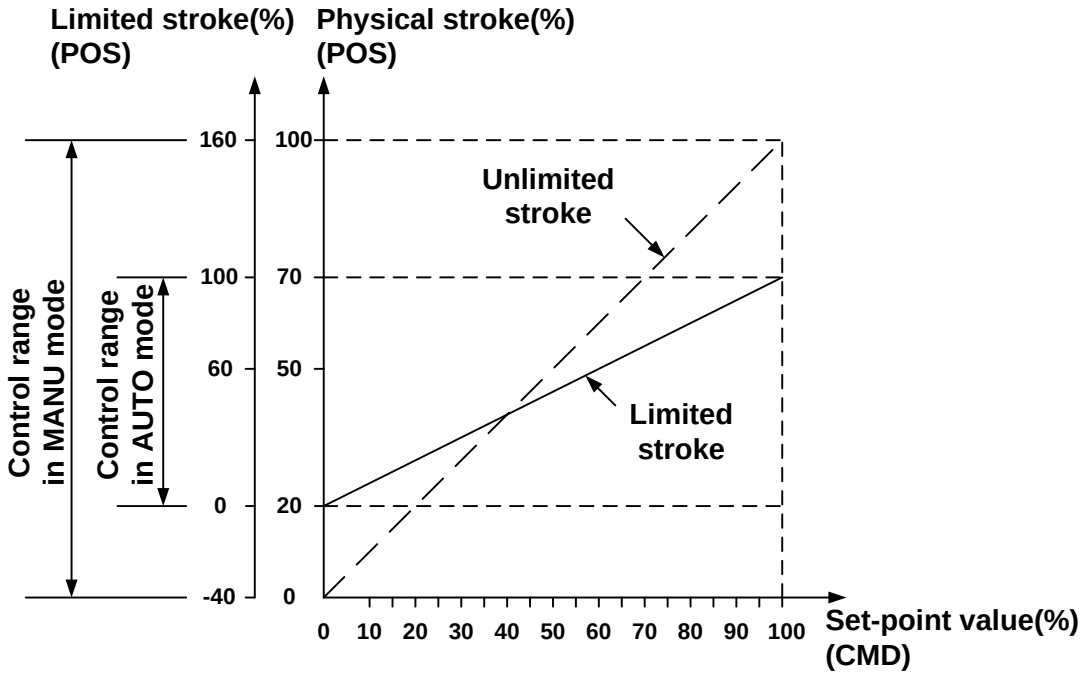


Figure 26. Graph LIM STROKE

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%.

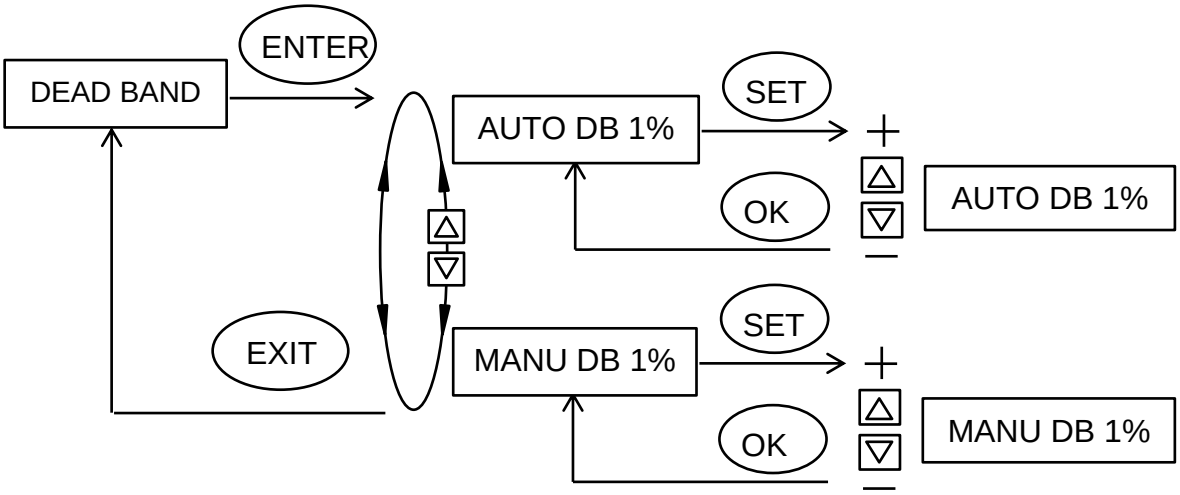


Figure 27. Operating structure DEAD BAND

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.

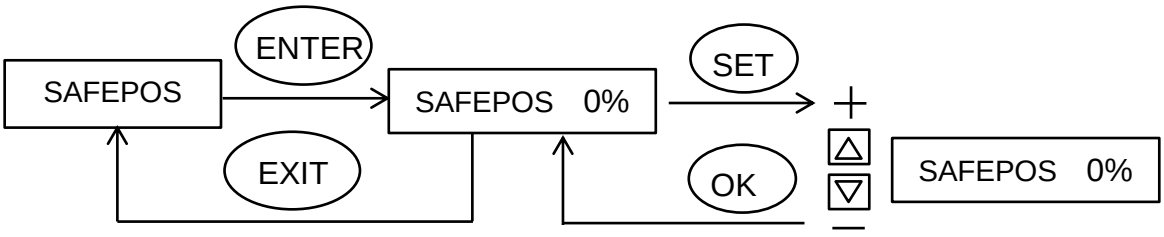


Figure 28. Operating structure SAFEPOS

5.3.3.7. BINARY IN(optional)

Factory setting:
SWITCH option: CLOSE
FUNCTION option: SAFEPOS
TYPE option: NORMAL OPEN
The function is used to operate the positioner to achieve some functions by binary input signal. If the product selection has no feedback signal, this function is invalid.

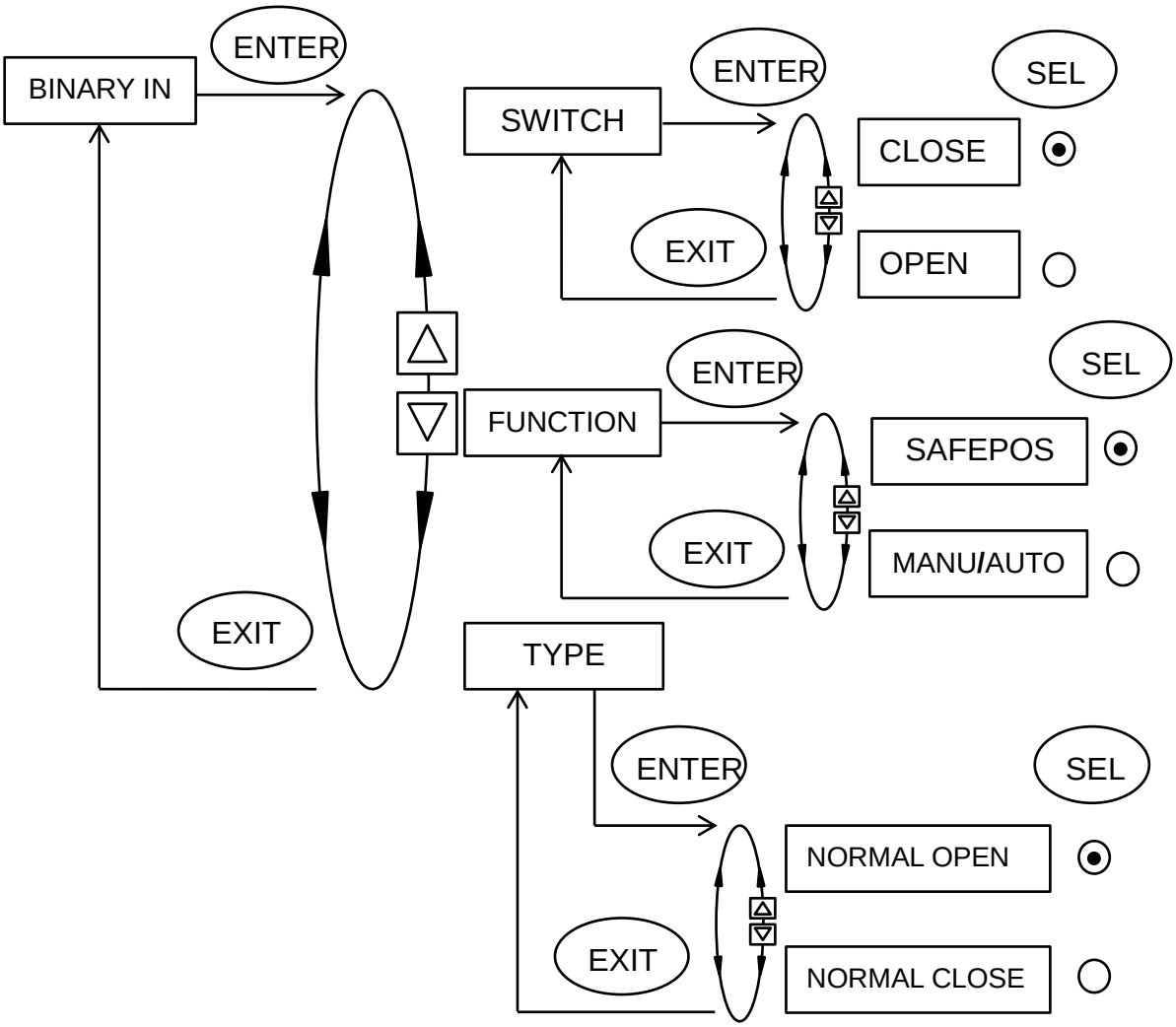


Figure 29. Operating structure BINARY IN

Option	Description
SWITCH	Open or close the BINARY IN function.
FUNCTION	Select the operating function of binary input signal.
TYPE	Select the effect type of binary input signal. When selecting NORMAL OPEN option, 0-3V = logic "0", 15-30V = logic "1". When selecting NORMAL CLOSE option, 0-3V = logic "1", 15-30V = logic "0".

Table 7. Option BINARY IN

Option	Description
SAFEPOS	The position of valve stroke is adjusted to the safety position by logic "1". The function inactive by logic "0". The function is only active in the automatic mode.
MANU/AUTO	The system operates in the automatic mode by logic "0". The system operates in the manual mode by logic "1". Switching the operating mode is inactive by the function key on the operating interface when the function is enabled.

Table 8. Option BINARY IN FUNCTION

5.3.3.8. OUTPUT(optional)

Factory setting:
ANALOGUE option: POS
ANALOGUE TYPE option: 4-20 mA
BINARY option: LIM DEV
BINARY VAL DEV value: 10%
BINARY VAL POS value: 100%
BINARY TYPE option: NORMAL OPEN

The function is used to let system output related control parameters or operating states to the other terminals.
One analogue output (can be selected according to product type selection): analogue signal of the current position (POS) or of the set-point value (CMD). Two output signal types (4-20mA, 0-20mA) can be selected.
Two binary outputs: 0/24V binary signal of operating state related with the system.
If the product selection has no feedback signal, this function is invalid.

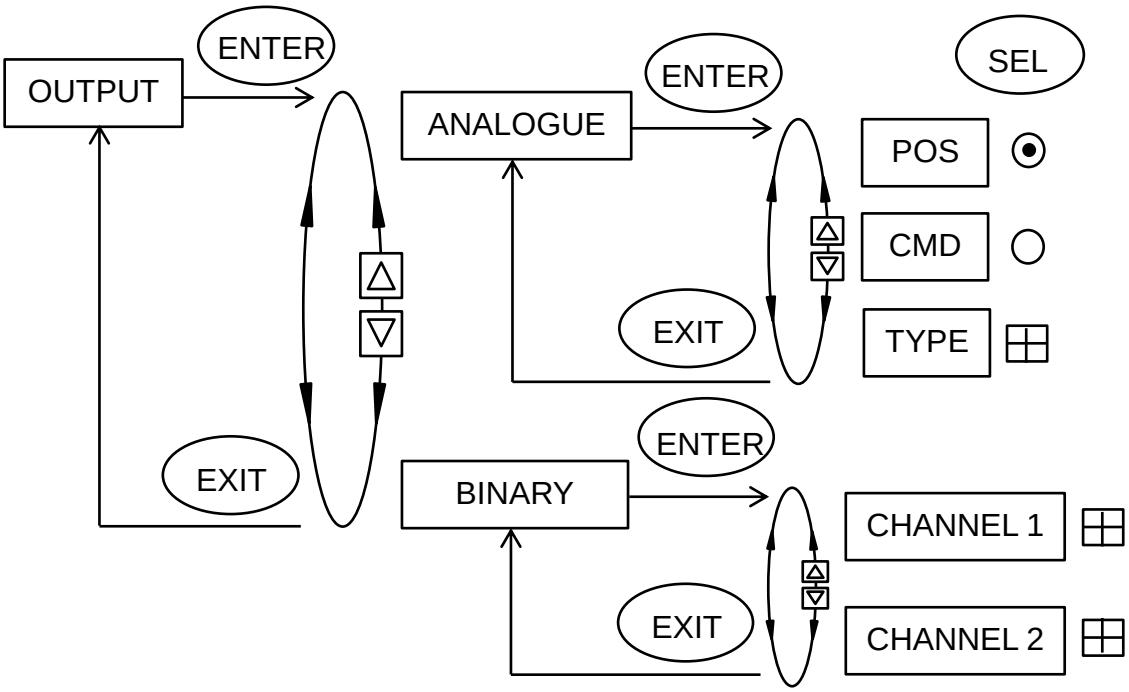


Figure 30. Operating structure OUTPUT

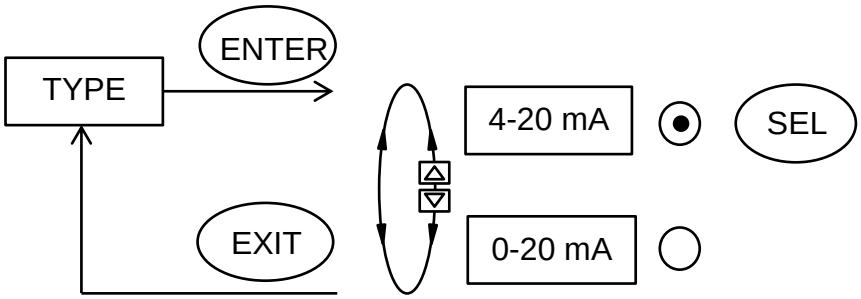


Figure 31. Operating structure ANALOGUE TYPE

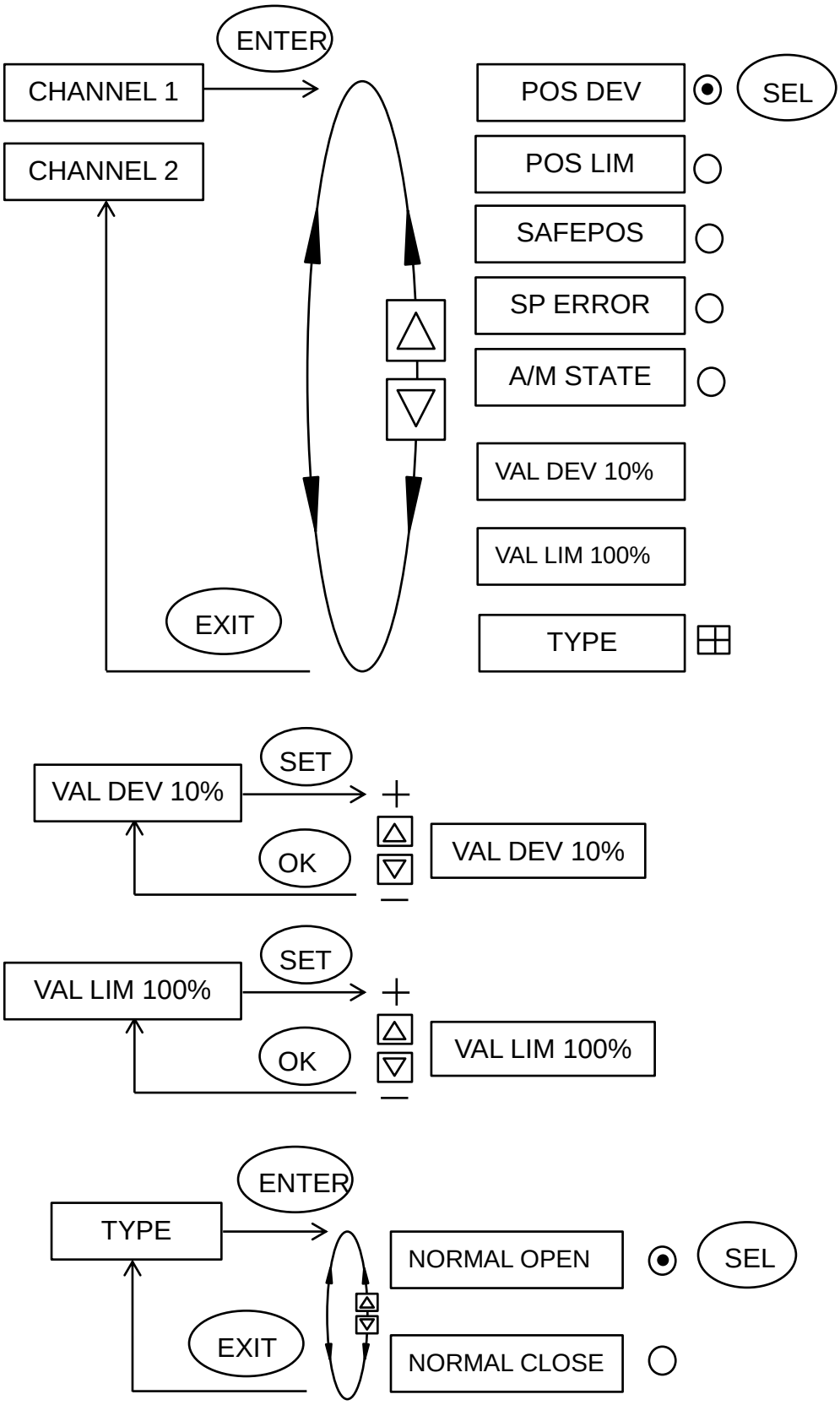


Figure 32. Operating structure OUTPUT BINARY

Option	Description
POS DEV	Output for excessively large control deviations of the positioner in the automatic mode. System outputs 24V signal (NORMAL OPEN) or 0V signal (NORMAL CLOSE) when the deviation between position value and position set-point value bigger than the setting deviation set in the VAL DEV option. Otherwise system outputs 0V signal (NORMAL OPEN) or 24V signal (NORMAL CLOSE). The function is inactive in the manual mode and keeps previous state.
POS LIM	Output for the compare relation between the current position and a specified limit position in the automatic mode. System outputs 24V signal(NORMAL OPEN) or 0V signal (NORMAL CLOSE) when the current position bigger than the specified limit position set in the VAL LIM option. Otherwise system outputs 0V signal (NORMAL OPEN) or 24V signal (NORMAL CLOSE). The function is inactive in the manual mode and keeps previous state.
SAFEPOS	Output for the current position whether is in safety position in the automatic mode. System outputs 24V signal (NORMALLY OPEN) or 0V signal (NORMAL CLOSE) when the current position is in safety position. Otherwise system outputs 0V signal (NORMALLY OPEN) or 24V signal (NORMAL CLOSE). The function is inactive in the manual mode and keeps previous state.
SP ERROR	Output for error signal for set-point value. System outputs 24V signal (NORMAL OPEN) or 0V signal (NORMAL CLOSE) when detecting the error signal for set-point value. Otherwise system outputs 0V signal (NORMAL OPEN) or 24V signal (NORMAL CLOSE).
A/M STATE	Output for the state of operating mode. System outputs 24V signal (NORMAL OPEN) or 0V signal (NORMAL CLOSE) when the positioner is working in the manual mode. System outputs 0V signal (NORMAL OPEN) or 24V signal (NORMAL CLOSE) when the positioner is working in the automatic mode.

VAL DEV	The setting of deviation value for POS DEV option.
VAL LIM	The setting of limit position value for POS LIM option.
TYPE	Select the effect type of binary output signal.

Table 9. Option OUTPUT BINARY

5.3.3.9. 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 ≤ 3.5mA. 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 single-acting power-off safe positioner will exhaust the actuator cylinder's air and the single-acting power-off freeze positioner will keep the valve position and the double-acting positioner will leave the valve position in a free state.

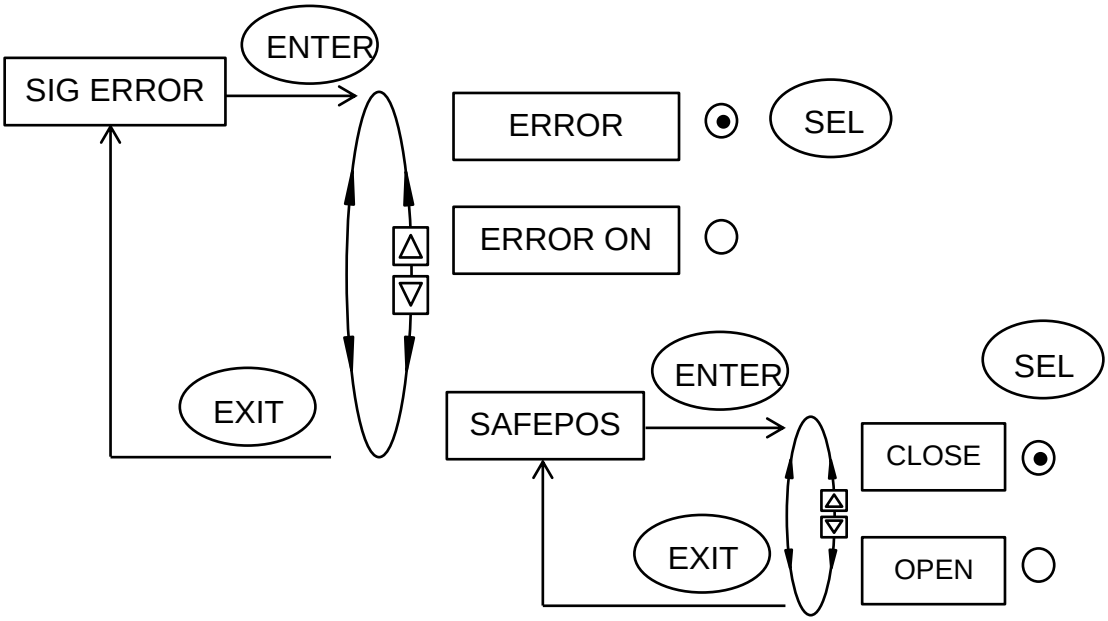


Figure 33. Operating structure SIG ERROR

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. The Actuator is fully deaerated by selecting CLOSE and ERROR ON option when detecting the error signal.

Table 10. Option SIG ERROR

5.3.3.10. 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: 765
CAL INPUT MAX for 4-20mA: 3823
CAL INPUT MIN for 0-20mA: 0
CAL INPUT MAX for 0-20mA: 3823
CAL INPUT MIN for 0-10V: 0
CAL INPUT MAX for 0-10V: 3413
CAL INPUT MIN for 0-5V: 0
CAL INPUT MAX for 0-5V: 1707

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.

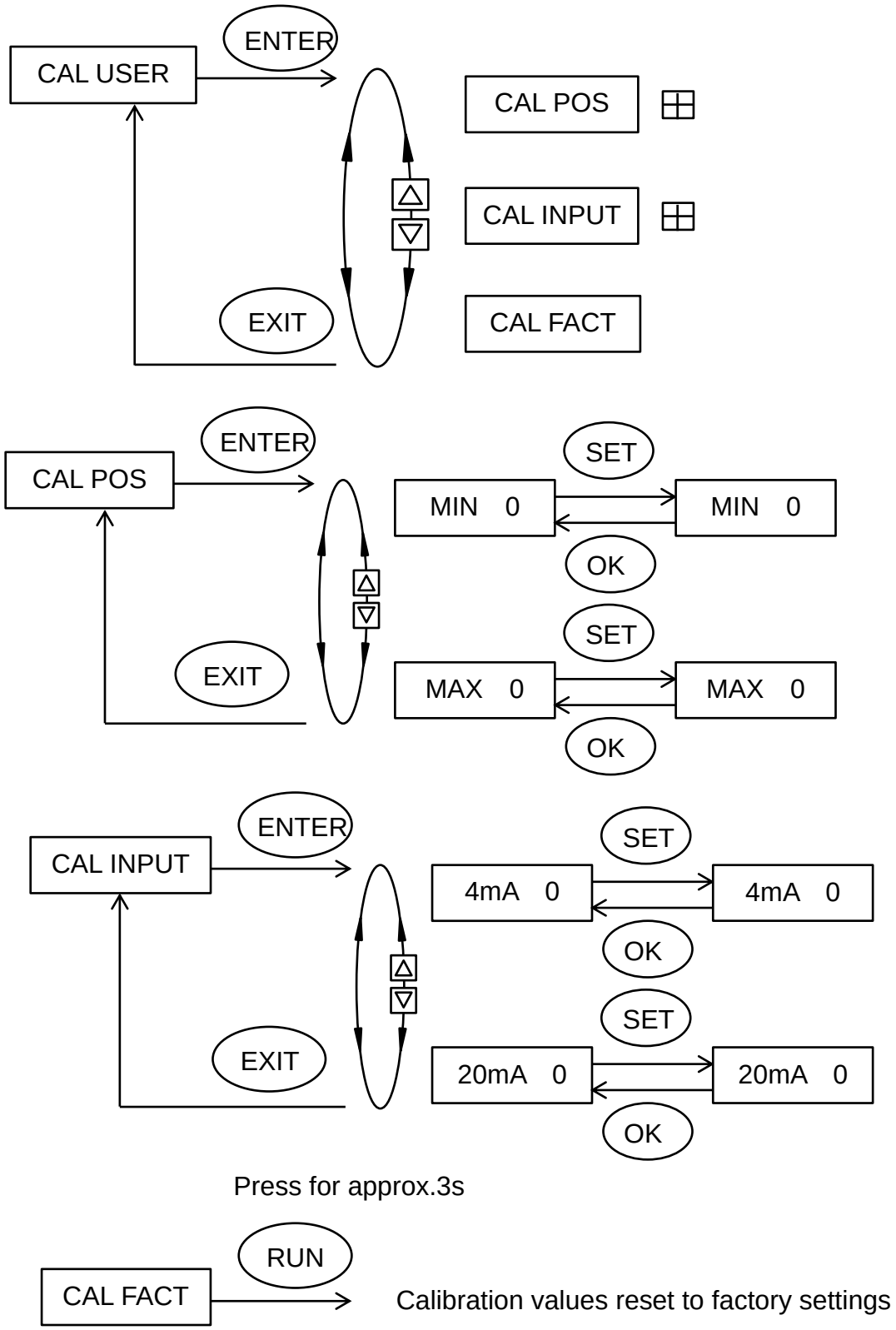


Figure 34. Operating structure CAL USER

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 11. 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.

5.3.3.11. 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.

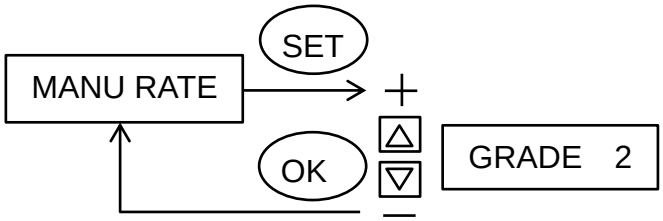


Figure 35. Operating structure MANU RATE

5.3.3.12. 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.

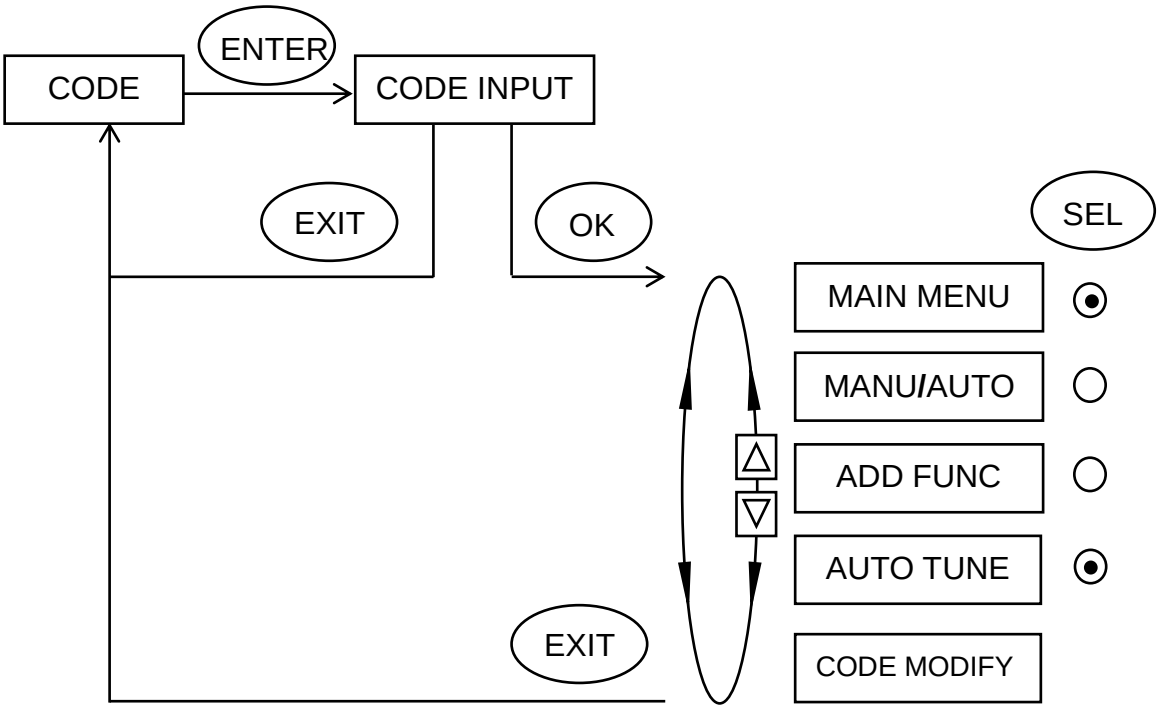


Figure 36. Operating structure CODE

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 12. Option CODE

5.3.3.13. 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.

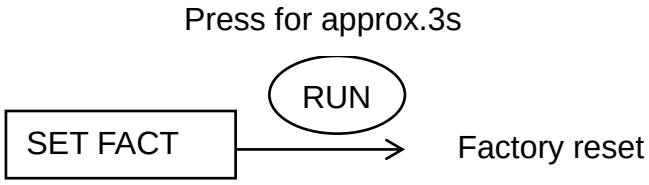


Figure 37. Operating structure SET FACT

5.3.4.LANGUAGE

The option is used to select the interface language.

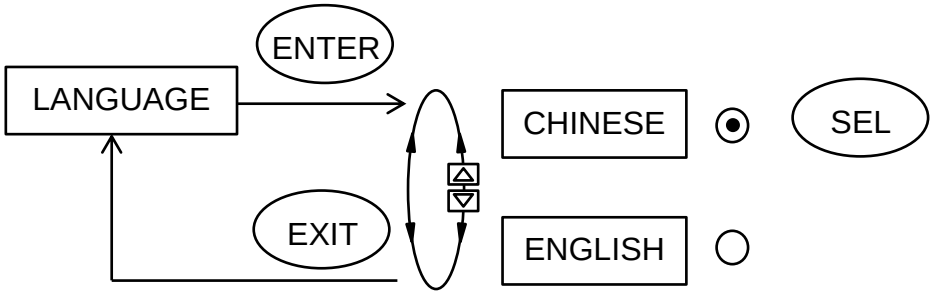


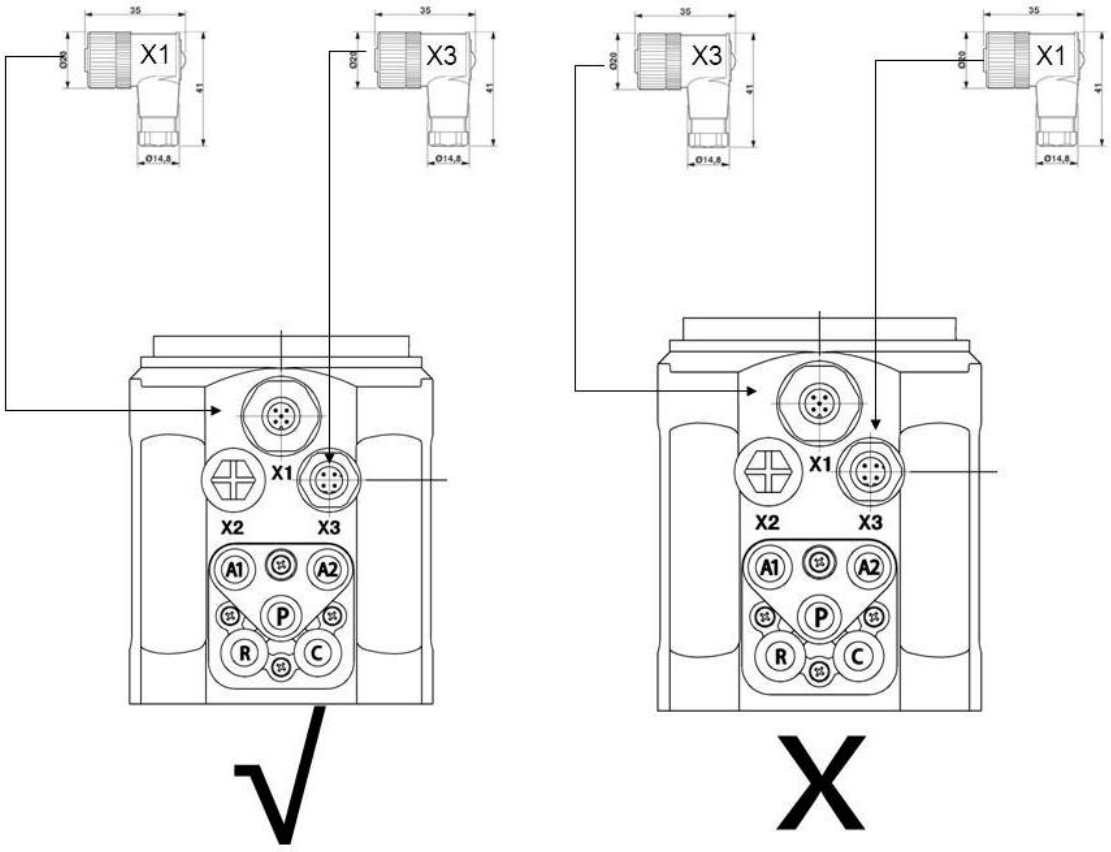
Figure 38. Operating structure LANGUAGE

6. Trouble shooting

1. **LCD 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.

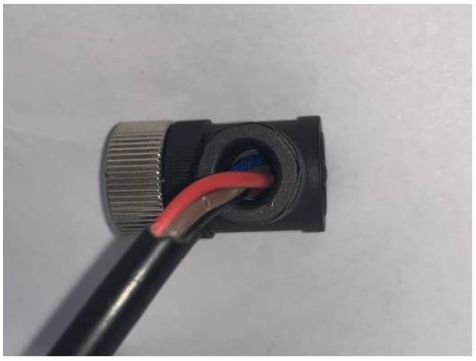
7. Attention

1. The power supply voltage of the positioner is 24V DC ±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 um 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 um 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 X3. Error connecting by strong force will destroy the electrical male connector.



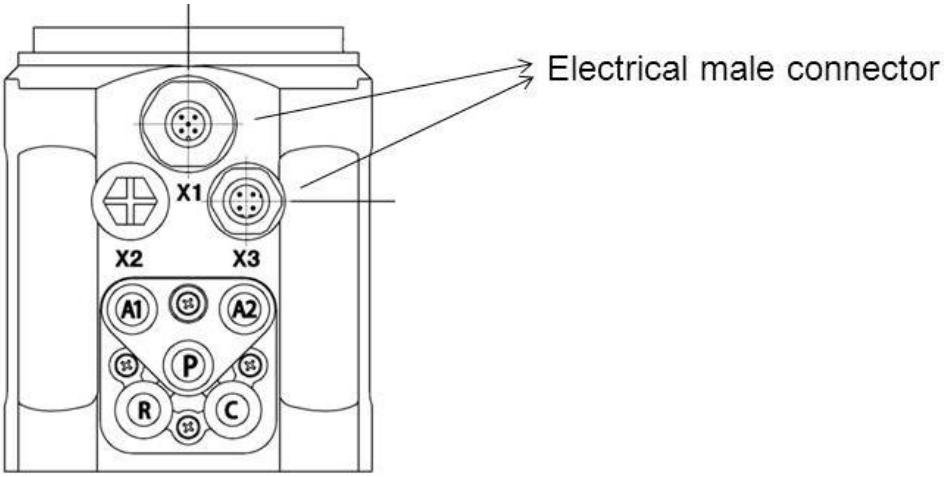
2> The cable diameter which is compatible with the waterproof electrical connectors is PG7 (4mm-6mm). Please use the multi - core cable with external insulation protection skin, otherwise the electrical connectors cannot achieve IP66 protection class.
Correct and error wiring ways are showing in the following pictures.

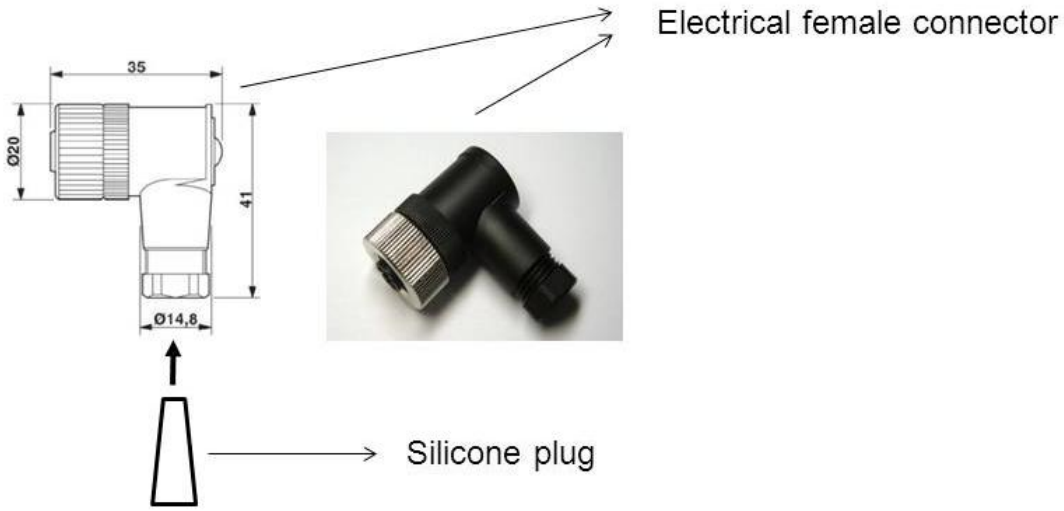
√



X

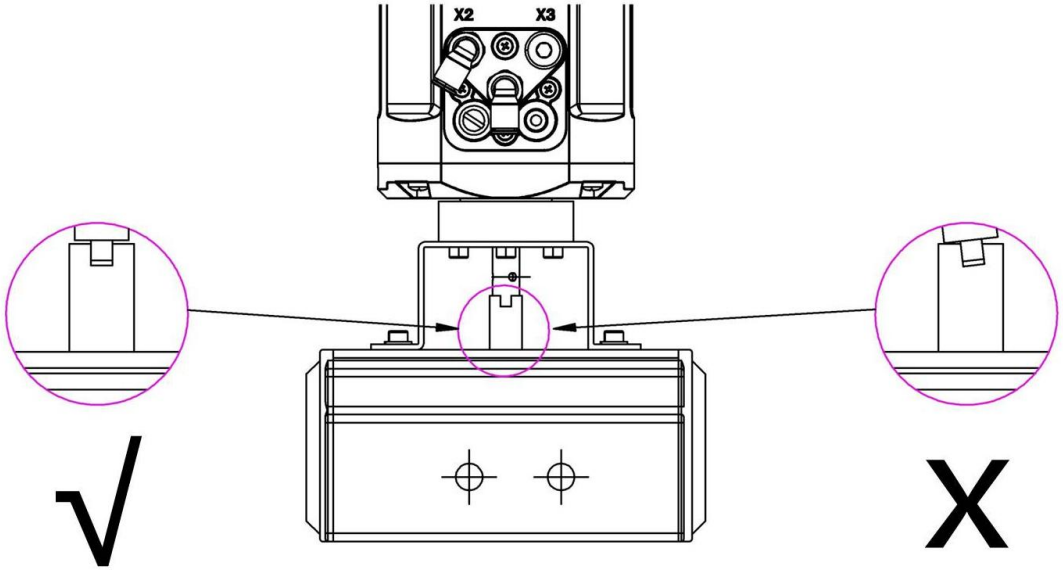
3> If the electrical male connectors are not used for a long time, to prevent water vapor or corrosive gases corroding the connector pins or entering the positioner inside, please screw on the electrical female connectors and block another side of the electrical female connectors with the silicone plugs. 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.
5. For matching the angle stroke actuator, make sure that the groove of the actuator axis is vertical, so that the connection between the actuator axis and the positioner sensor is suitable. Otherwise the radial load force will destroy the sensor. If the product is damaged by the above reason, it will lose warranty.



8. Explosion-proof

8.1. Standard

GB3836.1 – 2010 Explosive atmospheres — Part 1: Equipment — General requirements.
GB3836.8 – 2014 Explosive atmospheres — Part 8: Equipment protection by type of protection "n".
Explosion-proof mark: Ex nA Ⅱ C T4 Gc.
Explosion-proof certification number: GYB16.1644X.

8.2. Special conditions for Safe use

1. To prevent the danger of ignition due to static electricity, it is forbidden to rub the non-metallic part of the product case.
2. After installation of the product, it must be ensured that the overall case protection level is not lower than IP54 specified in the GB4208-2008 standard.
3. It is forbidden to insert or pull out the external connector of the product during power-on.
4. When using in the field, transient protection measures should be taken to prevent the rated voltage from exceeding 40% due to transient interference.

8.3. Product use notes

1. When using and maintaining on site, the principle of "do not open the cover of the product in the explosive atmospheres" must be followed.
2. Product rated parameter: 24V DC.
3. Users are not allowed to replace parts of the product. To prevent the occurrence of damage, users should work with product manufacturer to solve the problems that occur in operation.
4. The installation, use and maintenance of the product should comply with the requirements of the product user's manual and the following related standards and specifications.
   GB3836.13 – 2013 Explosive atmospheres — Part 13: Equipment repair, overhaul and reclamation.

GB3836.15 – 2000 Electrical apparatus for explosive gas atmospheres — Part 15: Electrical installations in hazardous areas (other than mines).

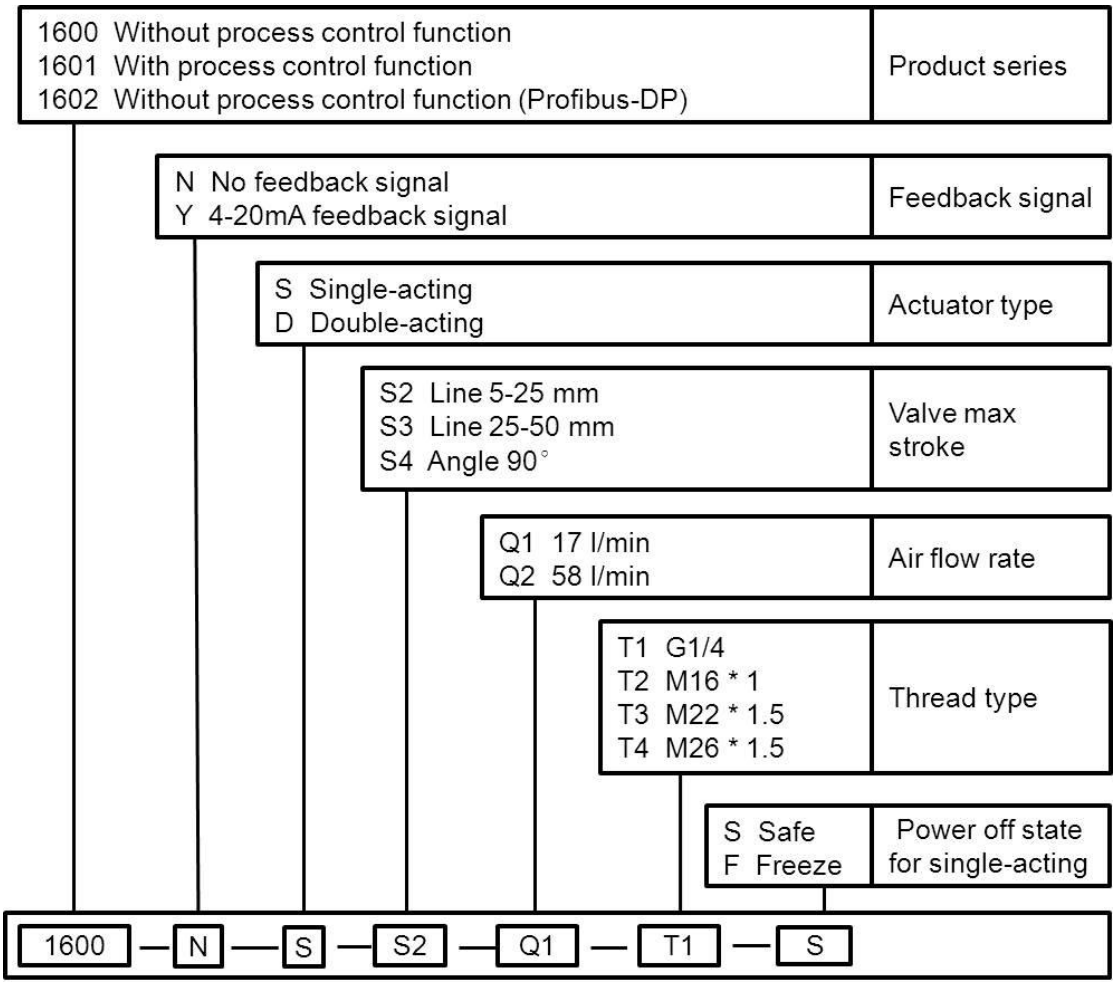
GB3836.16 – 2006 Electrical apparatus for explosive gas atmospheres — Part 16: Inspection and maintenance of electrical installation (other than mines).

GB50257 – 2014 Code for construction and acceptance of electric equipment on fire and explosion hazard electrical equipment installation engineering.

9. 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.

10. Technical specifications



Remark:

In the **air flow rate** option, code Q1 is suggested to match the actuator of 40-100 mm internal gas chamber diameter, code Q2 is suggested to match the actuator of 125-160 mm internal gas chamber diameter. Code Q2 is only used for single-acting actuator, and only in **Freeze** state when power-off. The air flow rates for code Q1 and Q2 are under the condition of 0.6Mpa input pressure.

In the **valve max stroke** option, AT actuator range for code S4 is AT50~AT125. For other actuator models, please consult our company. It is no need to select the **thread type** option for code S4.

Power off state for single-acting option is **Safe** by default. 1602 type is without 4-20mA feedback signal.

V220627

The changed contents of this manual are not noticed.
The Company reserves the final interpretation for related technical updating.

本说明书内容变更，恕不另行通知。

相关技术更新本公司保留最终解释权。