

FLUID CONTROL DIVISION

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IOM-PR
(Rev 0122)



INSTALLATION, OPERATING & MAINTENANCE INSTRUCTIONS PA SERIES NORMALLY CLOSED ANGLE SEAT VALVES WITH DIGITAL POSITIONER AND FEEDBACK 2-WAY NORMALLY CLOSED



WARNING

GENERAL SAFETY INSTRUCTIONS BEFORE INSTALLATION

FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF THE PRODUCTS AND/OR SYSTEMS DESCRIBED HEREIN OR RELATED ITEMS CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

This document and other information from Parker Hannifin Corporation, its subsidiaries and authorized distributors provide product and/or system options for further investigation by users having technical expertise. It is important that you analyze all aspects of your application, including consequences of any failure, and review the information concerning the product or system in the current product catalog. Due to the variety of operating conditions and applications for these products or systems, the user, through its own analysis and testing, is solely responsible for making the final selection of the products and systems and assuring that all performance, safety and warning requirements of the application are met.

The products described herein, including without limitation, product features, specifications, designs, availability, and pricing, are subject to change by Parker Hannifin Corporation and its subsidiaries at any time without notice.

Carefully read Installation, Operation and Maintenance procedures prior to installing or servicing valve.

Do not use valve as a safety shut-off valve when making repairs.

Do not install a valve before depressurizing system down to atmospheric pressure.

Care must be taken to ensure that the valve materials selected are suitable for the media being handled. Parker assumes no liability for damage caused by improper material selection in the case of corrosion from aggressive media.

CAUTION: Do not, at any time, make any alteration or modifications to any angle seat valves without the express and written approval of Parker's Fluid Control Division.

DESCRIPTION

These valves are 2-way normally closed (N.C.) valves with stainless steel construction and are pneumatically actuated, which requires a 24VDC supply power. The positioner adjusts the valve stroke by monitoring the stem position in relation to the input signal.

PRINCIPLES OF OPERATION

2-way PA SERIES - NORMALLY CLOSED VALVES

The angle seat valve is kept closed by a spring which presses against a piston and piston rod forcing the seating to seal tightly against the valve seat. When pressure is applied to the actuator pilot connection, the piston, piston rod, and seating seal are raised thus opening the valve.

The valve closes tightly when pressure is removed from the pilot connection.

The maximum permitted angle seat valve pressure, pilot valve pressure, and temperature ranges are described on the valve data label.

CAUTION: A minimum pilot operating pressure is required for proper angle seat valve operation.

Installation Instructions

Mounting position and pressure limits: Valves can be mounted directly on piping and are designed to operate in any position. The valves may be installed in any line regardless of the direction in which the line runs. However, for optimum life and performance the valves should be mounted vertically with the actuator upright to minimize wear and reduce the possibility of foreign matter accumulating inside the stem area.

Line pressure and pilot pressure must conform to Actuator nameplate rating.

WARNING: *Depressurize system and turn off electrical power to the pilot valve before attempting to remove valve from piping. Failure to depressurize the system could result in injury.*

CAUTION: *When the valve is to be removed from the piping system, the pipeline must be drained completely before removing the valve, especially with hazardous or aggressive media that can be hazardous to health.*

Installation Steps

Installation must be done according to all applicable Safety Codes and Standards and by qualified personnel.

Inspect valve prior to installation. Damaged valves or actuators must not be installed.

Ensure that the valves are installed whose pressure class, line pressure, type of connection and connection dimensions correspond to the usage conditions.

WARNING: *Do not install a valve whose permitted pressure / temperature ratings are inadequate to meet the operating conditions.*

Threaded connections are the most common. ANSI flanges, welded ends and tri-clamps are also available.

Piping: Remove any protective enclosures from the body ports and connect supply line to the inlet port of the valve. An arrow on the body indicates direction of flow. Use of Teflon tape, thread compound or sealant is permissible, but should be used sparingly to male pipe threads only. Connect outlet line to the opposite port.

Ports should not be subjected to excessive torque by use of an oversized wrench, wrench extension or by impacting the wrench handle. Do not use the valve to “stretch” or “align” the pipe. Using the pipe to close a large gap can distort the valve or at least stress it unduly, and possibly cause it to malfunction, or the threaded ports may be damaged or stripped.

Flanges: For flanged mounted valves, follow applicable ANSI, DIN, JIS specifications for bolting and torque recommendations. The bolt should pass first through the mounting flange before engaging the valve flange. Allow proper spacing for installing the valve. Do not use the valve to “stretch” or “align” the pipe. Using flange bolts to close a large gap can distort the valve or at least stress it unduly, and possibly cause it to malfunction, or the bolts may be damaged or stripped.

The flange endings on the pipeline must align with the connection flanges on the valve and the faces must be parallel. Flanges which are out of alignment or not parallel may result in unacceptable stresses in the pipeline during installation and could thereby damage the valve.

Welding: Care should be taken when welding connections to avoid damage to synthetic internal parts. If pipeline welding is to be performed, care must be taken to ensure the cleanliness of both joints. It is recommended that the flame be directed away from the valve body. Cool body with a wet cloth or heat sink on the extensions on the body to prevent overheating while welding.

Pressure and Valve Function Tests

It is recommended that newly installed pipeline systems first be flushed thoroughly to wash out all foreign matter.

The test pressure of an open valve must not exceed 1.5 times the maximum rated pressure of the angle seat valve. The test pressure of a closed valve must not exceed 1.1 times the maximum rated pressure of the angle seat valve.

Normal Operation and Maintenance

The angle seat pneumatic valves are operated by pneumatic control signals from the digital positioner. The valves do not require regular maintenance work. During routine system checks, no leakage should be found in the valve. If unacceptable leakage occurs, reference “Troubleshooting” section for recommended solutions.

CAUTION: *When the valve is to be removed from the piping system, the pipeline must be drained completely before removing the valve, especially with hazardous or aggressive media that can be hazardous to health.*

NOTE: *Depending on service conditions, fluid being used, filtration, and lubrication, it may be required to periodically clean or replace the valve.*

CAUTION: *Do not expose plastic or elastomeric materials to any type of commercial cleaning fluid. Parts should be cleaned with a mild soap and water solution.*

Approval

Parker Hannifin Fluid Control Division certifies its valve appliance products comply with the essential requirements of the applicable European Directives.

We hereby confirm that the appliance has been manufactured in compliance with the applicable standards and is intended for installation in a machine or application where commissioning is prohibited until evidence has been provided that the machine or application is also in compliance with EC directives.

The angle seat valve family complies with European Pressure Equipment Directive 2014/68/EU in accordance with Annex II, Category II, Group 2, Module A1.

WARNING: *THIS PRODUCT HAS NO AGENCY APPROVAL FOR USE IN HAZARDOUS LOCATIONS.*

Technical Specifications

Environmental Specifications

Ambient temperature: 32~140°F (0~60 °C)

Protection class: IP66

Vibration resistance parameter: 100Hz

Electrical Specifications

Connections: cable gland

Supply voltage:

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

Power input: <5W

Input resistance for set-point signal: 120 Ω

Analog output signal: maximum load 560 Ω

Mechanical Specifications

Cover material: Polycarbonate (PC)

Sealing material: Silicone rubber (SI)

Main body material: Polyamide Resin (PA6-GF30)

Control stroke range: 0.196-0.98 in (5-25 mm)

Pneumatic Specifications

Pilot air supply range: 43.5~101.5 psi (3~7 bar), specific values depending on the actuator

Connections: Plug-in hose connector G1/4

Air quality:

Clean dry air, according to ISO 8573-1;

Maximum particle density 10 mg/ m³;

Maximum particle size 40 micron;

Maximum oil content 25 mg/m³;

Maximum pressure dew point -4°F (-20 °C) or minimum 50°F (10 °C) below the lowest operating temperature.;

Air flow rate: 0.60 scfm (17L/min) (input pressure of 87 psi (0.6Mpa)).

Positioner Attributes

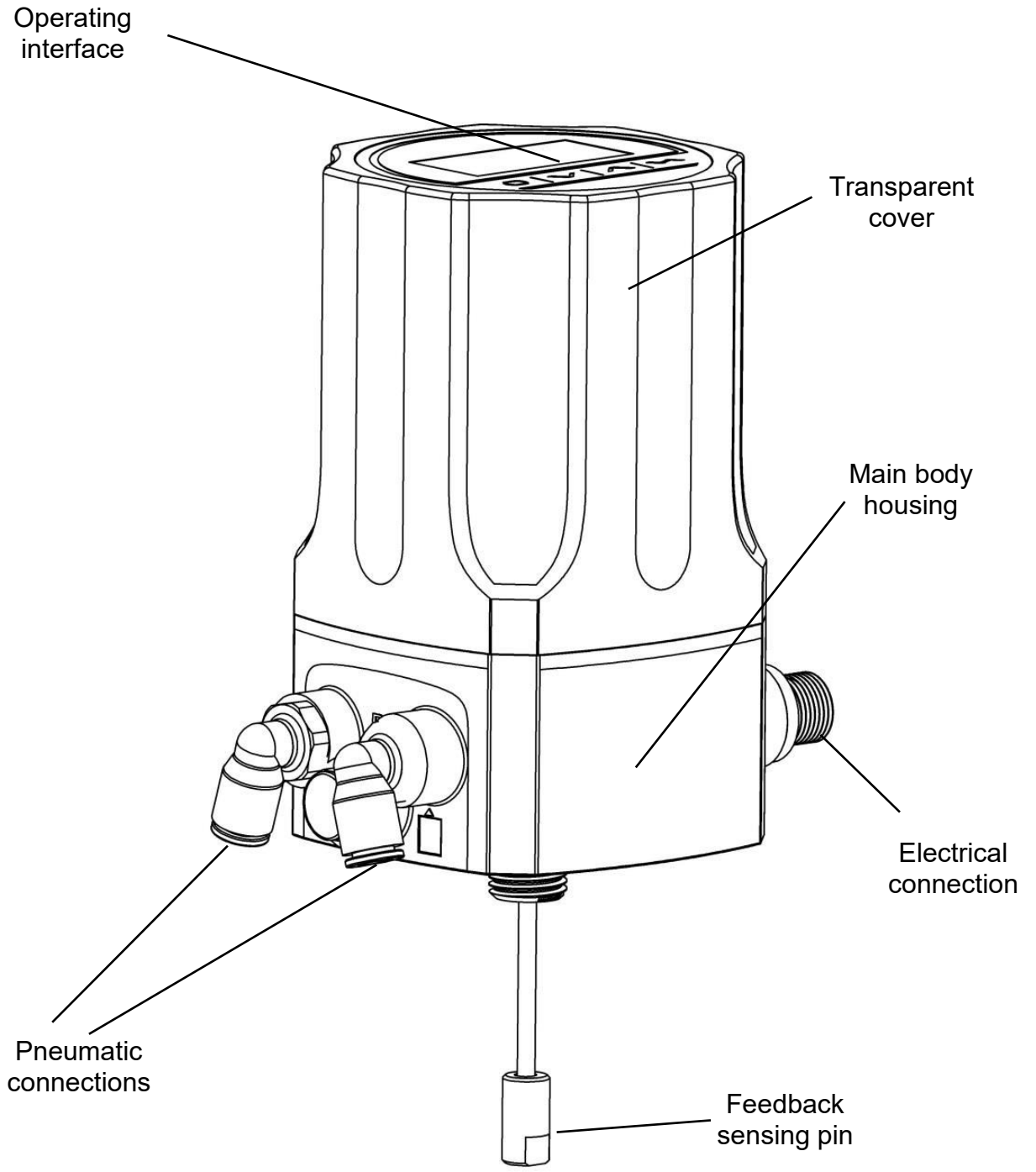


Figure 1. Positioner attributes

Electrical Connections

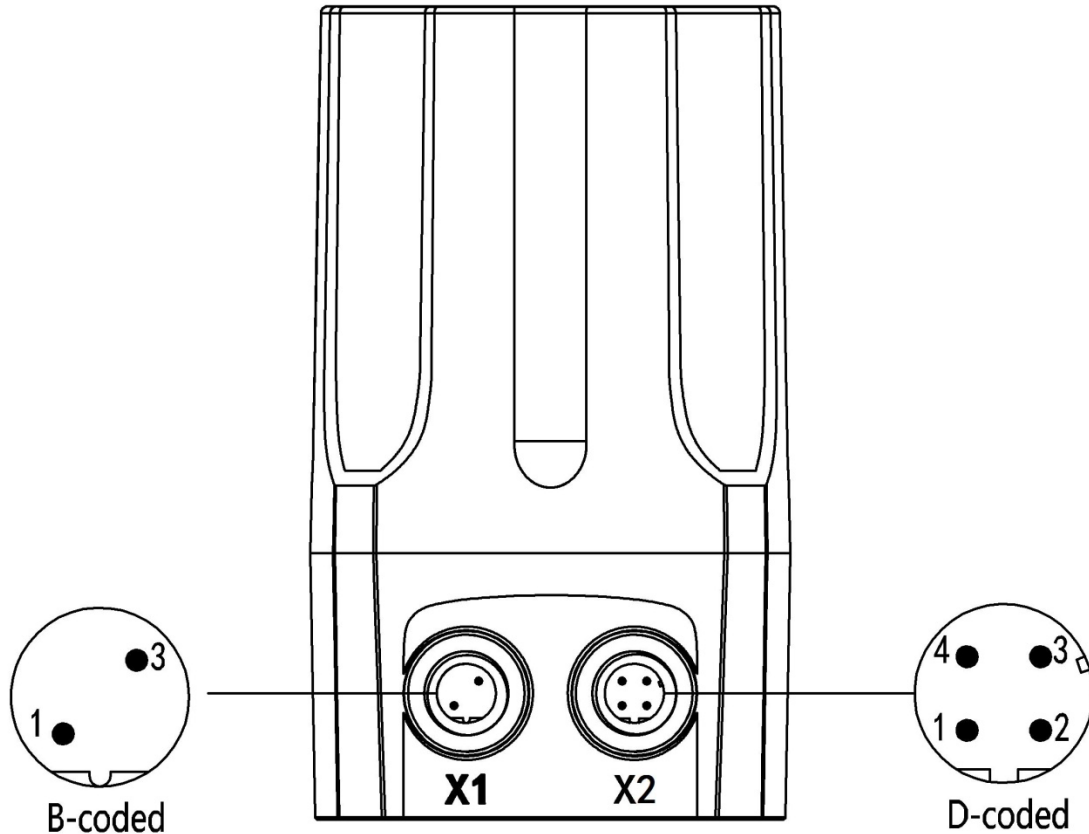


Figure 2. Connection

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

Table 1. Electrical connection description – X1

| 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 2. Electrical connection description – X2

CAUTION: Improper wiring to the electrical connectors may cause damage to the positioner electronics.

Pneumatic Connections

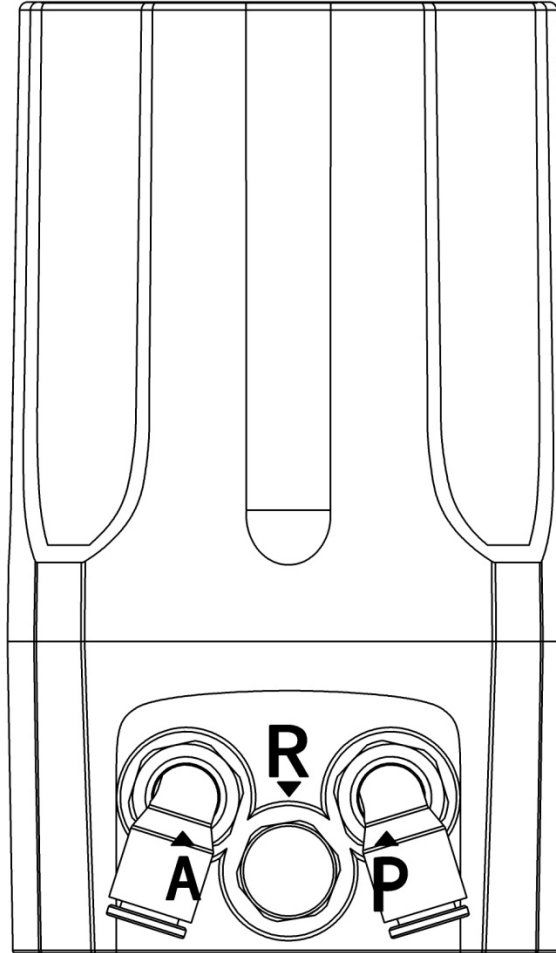


Figure 3. Pneumatic connections

| Connection | Description |
|------------|--|
| P | Pilot air supply (built-in filter, filter size 5 micron) |
| R | Pilot air exhaust |
| A | Actuator air connection |

Table 3. Pneumatic connections

DIGITAL POSITIONER Connections

Connect the pilot air supply to the “P” port on the positioner (Fig 3). Pilot air supply pressure greater than 101.5 psi (7 bar) may damage the positioner. The pilot air supply must be non-lubricated, dry industrial air filtered to 40 microns.

NOTE: *Pilot supply air must be instrument quality, free of water and oils.*

The electrical connection of the set point signal should be carried through a shielded cable. The external supply voltage should be connected via a separate cable.

Cable bushings not used should be sealed using a suitable sealing cap to preserve the protection class (IP66).

Operation


Interface Description

The positioner includes a 4-key control panel and an OLED display. The user can switch the display and set parameters and functions by pressing the four keys. **The functions of the keys are represented at the bottom of the display.**




Figure 4. Operating interface

Operating Mode and Operating Interface

The positioner has two operating modes: automatic mode (AUTO) and manual mode (MANU). The positioner defaults to operating in the automatic mode when powering up. At this time, the interface is locked. To unlock the interface, the user needs to press and hold both keys 1 and 4 under the  symbols until unlocked.

In the automatic mode, the positioner takes the 4-20 mA input signal for set-point value and adjusts the valve stroke automatically. In the manual mode, the user must press the “+/-” key to adjust the valve stroke manually.

The set-point value on the display will reflect the current valve position in the automatic mode. If changed to manual mode, by pressing the MANU key, it will continue to display the current valve position until the valve stroke is manually adjusted. The new position will be displayed on the manual mode interface.

The AUTO operating interface is shown in Table 4, and the MANU in Table 5. The interface will lock if no keys are pressed for a long time. To unlock the interface, the user needs to press and hold both keys 1 and 4 under the  symbols until unlocked (approximately for 3 seconds).

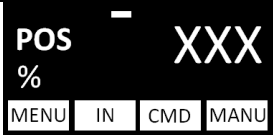
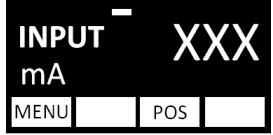
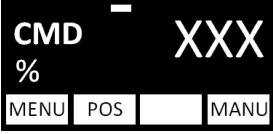

| Display | Description |
|---|---|
|  | Current position in the automatic mode. Press “POS” key or “AUTO” key to display. |
|  | The value of input signal in the automatic mode. Press “IN” key to display. |
|  | The set-point value in the automatic mode. Press “CMD” key to display. |
|  | Screensaver interface. It displays the valve position value. The cursor is displayed in automatic mode. |

Table 4. AUTO operating interface

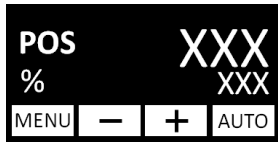
| Display | Description |
|---|---|
|  | Current position value (big font) and position set-point value (small font) in the manual mode. Current position is percentage open. Press "MANU" key to display. |

Table 5. MANU operating interface

Main Menu

The user can run specific functions or set specific parameters under the main menu. The menu interface has no lock function, therefore the user should exit to the operating interface from the main menu after making any changes. This will lock the operating interface.

Press and hold the MENU key for 3 seconds to open. Use the arrow keys to navigate to a specific function.

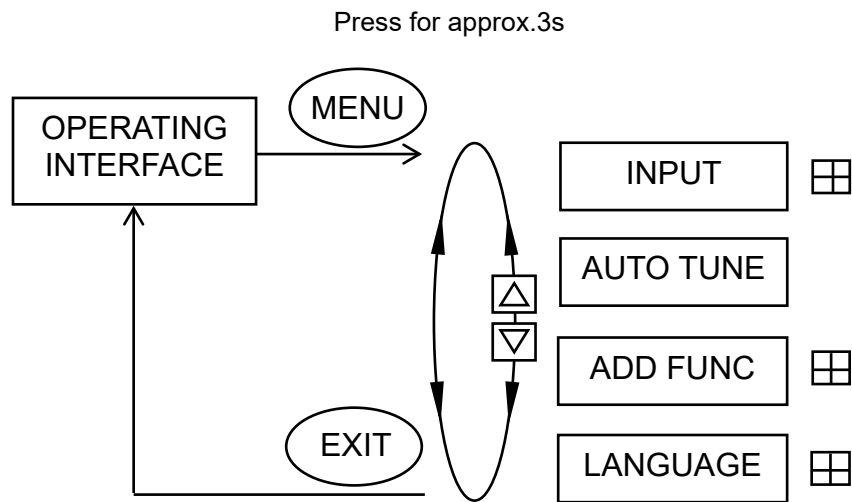


Figure 5. Operating sequence main menu

INPUT

This option is used to select the type of input signal for the set-point value. The factory setting is 4-20 mA, with the option of 0-20 mA.

Use the arrow keys to scroll to INPUT and press the ENT key to open the selection menu. Use the arrow keys to navigate to a specific function. Press the SEL key to select the desired feature. Press the EXIT key to return to the main menu.

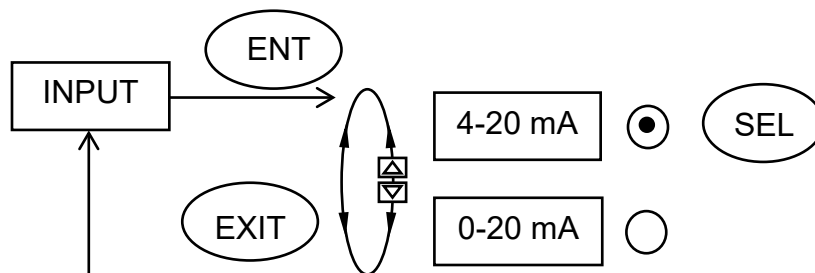


Figure 6. Operating sequence INPUT

AUTO TUNE

Although the positioner has been factory calibrated, the positioner must run the AUTO TUNE function again in the actual installation to establish the application control parameters.

This function can test the related control parameters and will take approximately 2-3 minutes, if running normally. The system will check whether the valve stroke range is in the effective range of the displacement sensor during the automatic adjustment process. Once the AUTO TUNE is completed, if "POS MIN ERROR" or "POS MAX ERROR" is displayed, refer to adjustment instructions in the **Positioner Replacement** section.

Use the arrow keys to scroll to AUTO TUNE and press and hold the RUN key for 3 seconds to start the process. A progress bar will show completion of each TUNE. Press the EXIT key to return to the main menu.

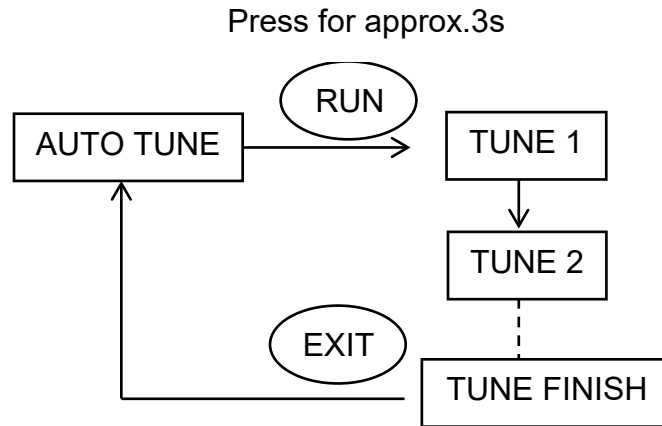


Figure 7. Operating sequence AUTO TUNE

NOTE: Make sure that the air supply pressure is in the working range of the pilot control pressure shown on the valve label. There should be little variance in the pilot supply pressure, otherwise the calibration may fail, or incorrect calibration parameters may be stored.

ADD FUNC

This function includes additional functions.

Use the arrow keys to scroll to ADD FUNC and press the ENT key to open the selection menu. Use the arrow keys to navigate to a specific function. Press the EXIT key to return to the main menu.

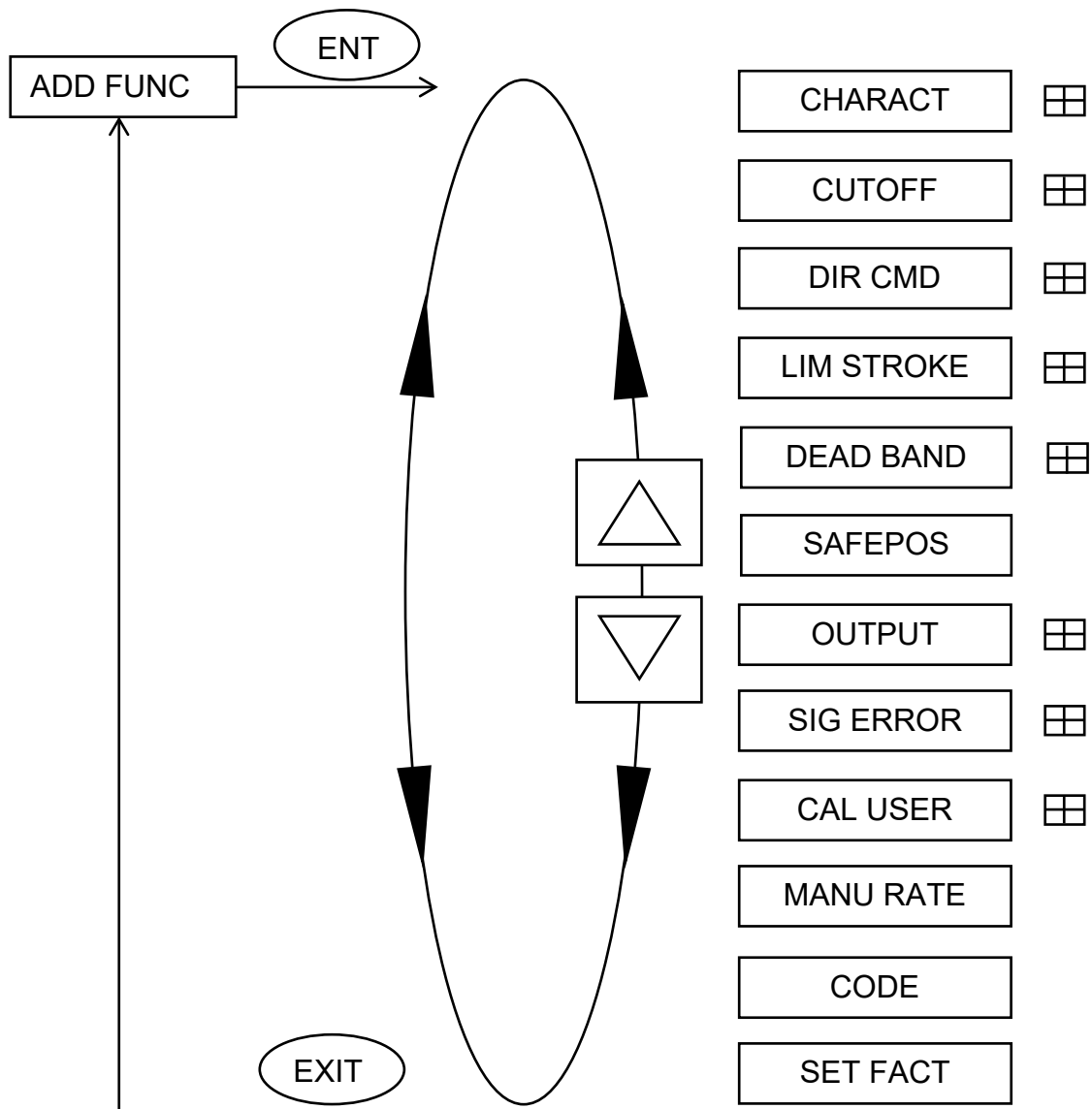


Figure 8. Operating sequence ADD FUNC

CHARACT

Factory setting:

LINEAR (Factory Default)

EQ PERC: 1:25, 1:33, 1:50, 25:1, 33:1, 50:1

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

The CHARACT function is used 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 a specific control characteristic, such as linearity. The user can select or set the characteristic option to meet the control requirement in the function menu.

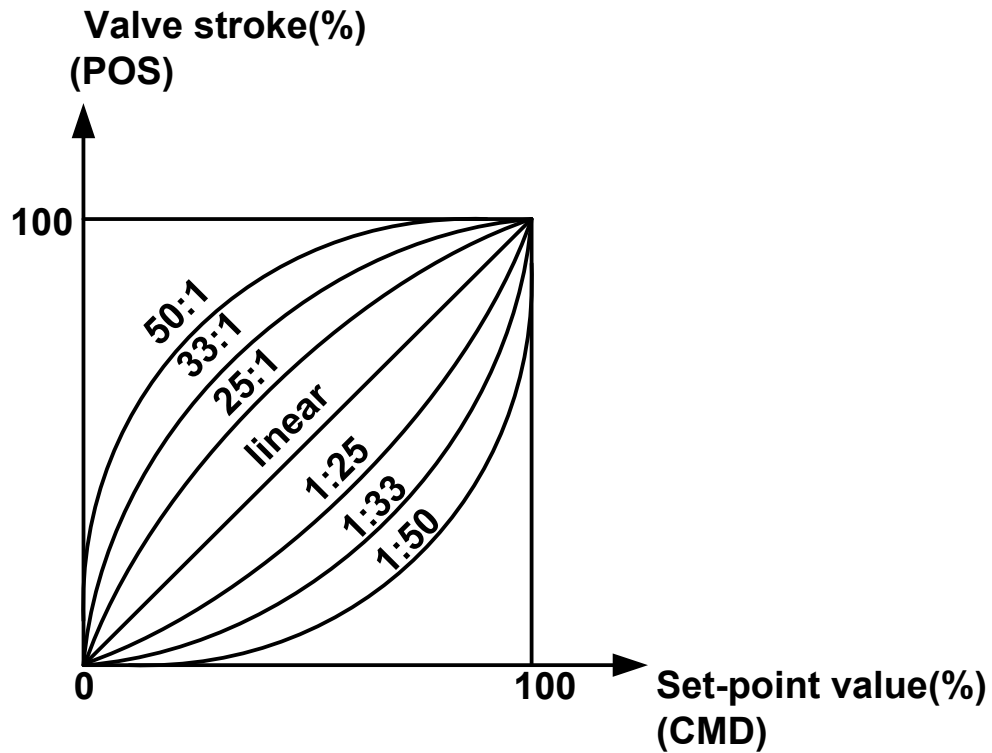


Figure 9. Graph characteristics of linear and equal percentage

Use the arrow keys to scroll to CHARACT and press the ENT key to open the selection menu. Use the arrow keys to navigate to a specific function. Press the SEL key to set or open the desired feature. Press the EXIT key to return to the main menu.

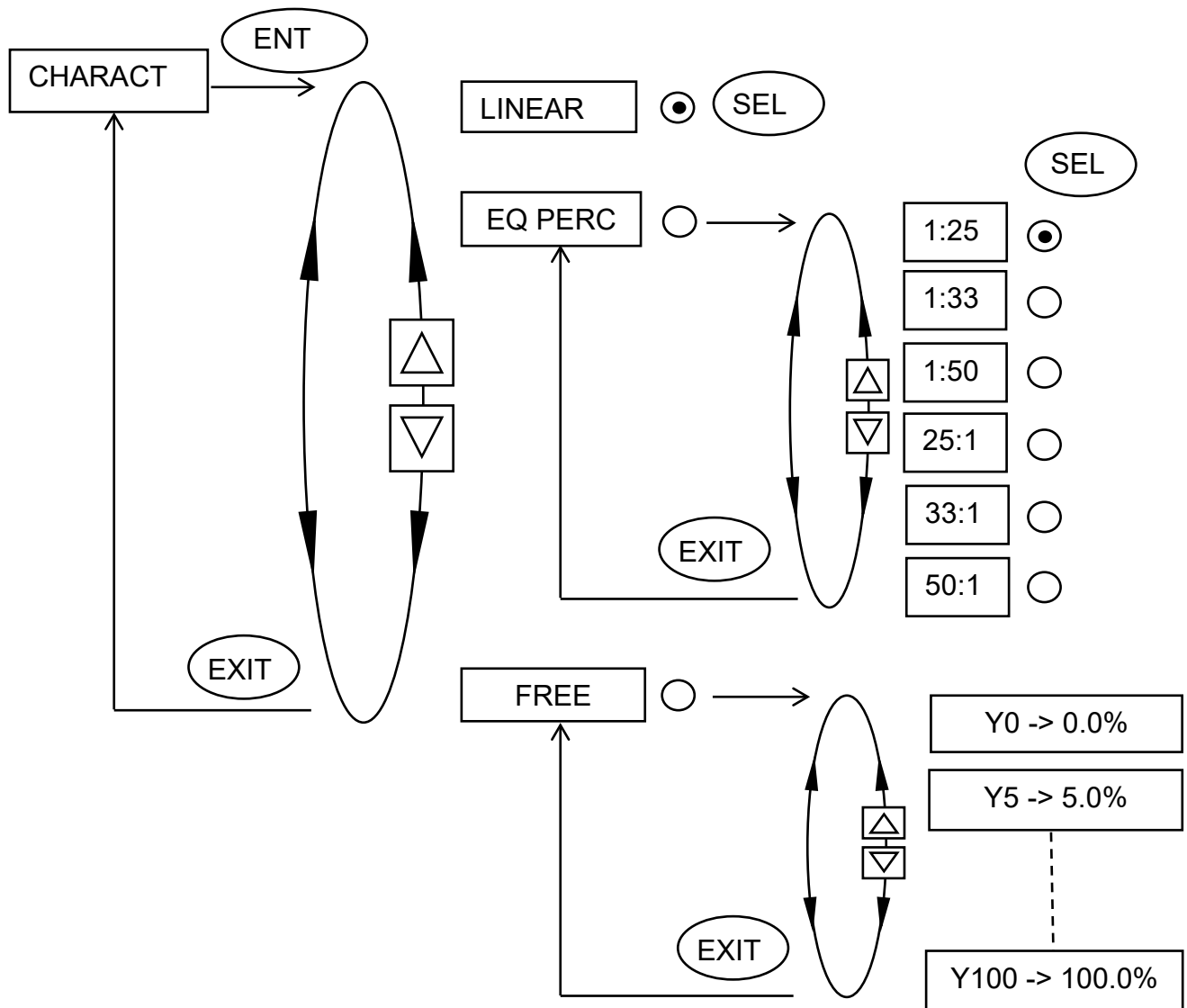


Figure 10. Operating sequence CHARACT

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

The user can program a custom characteristic with 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.

Use the arrow keys to scroll to FREE or EQUAL PERC and press the SEL key to open the selection menu. Use the arrow keys to navigate to a specific function. Press the SET key to set the desired feature. Click the arrow keys to adjust. Press the OK key to return to the selection menu. Press the EXIT key to return to the main menu.

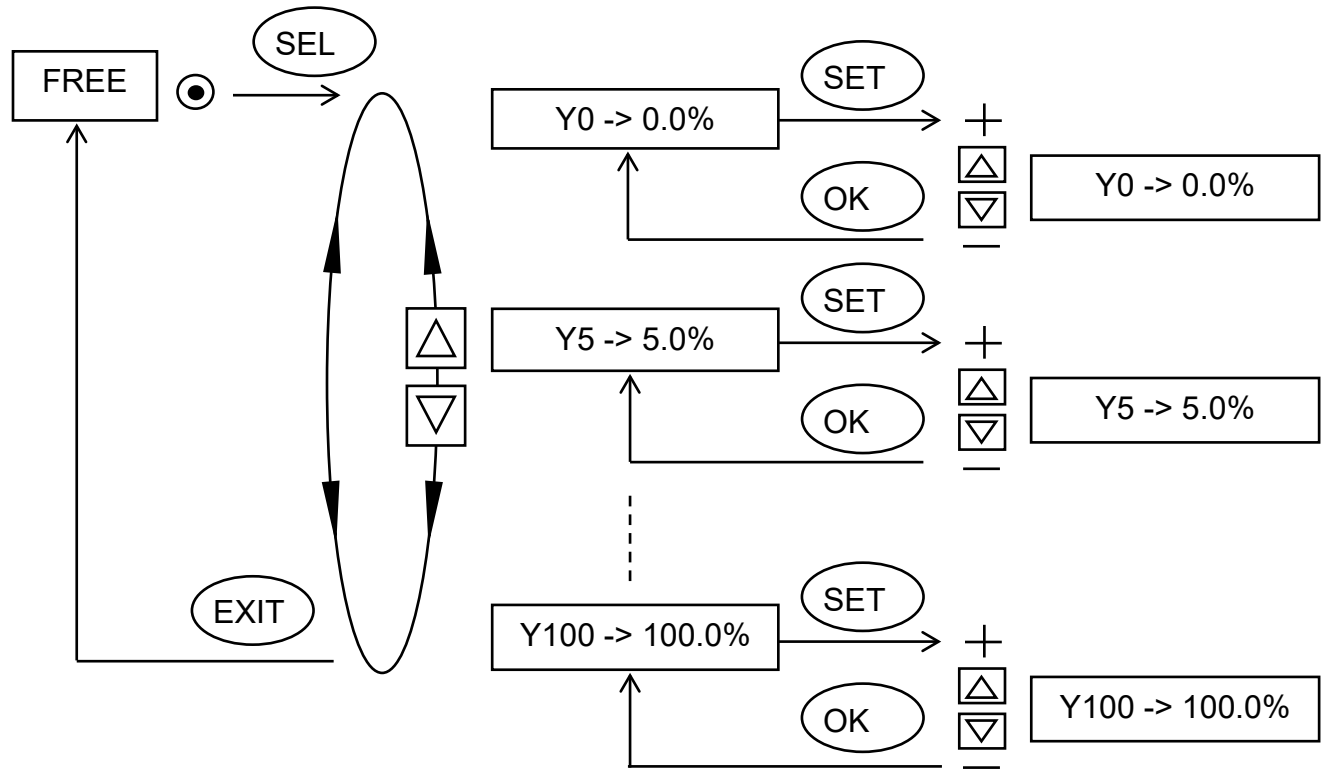


Figure 11. Operating sequence CHARACT FREE

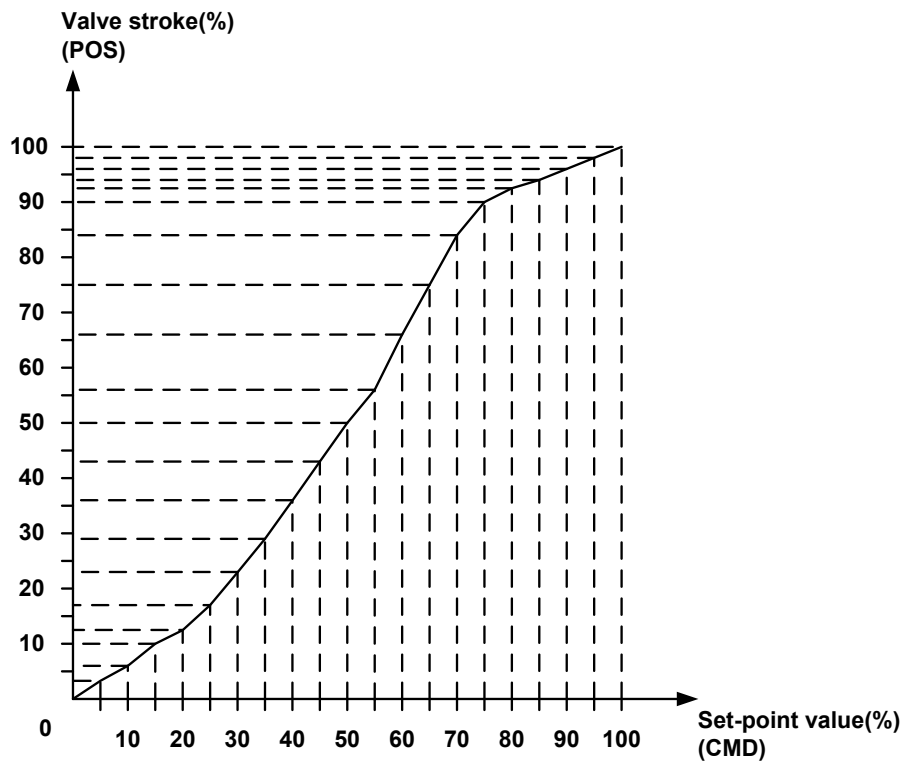


Figure 12. Graph CHARACT FREE

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 actuator will be fully pressurized or evacuated. The valve is fully closed 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.

This function has the options of 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 this function is enabled, the text "CUT OFF" is displayed 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 this function is enabled, due to the actuator internal characteristics, the valve position will have some deviations after the valve is 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.

Use the arrow keys to scroll to CUTOFF and press the ENT key to open the selection menu. Use the arrow keys to navigate to a specific function. Follow the same process to open AUTO CUT and MANU CUT. Press the EXIT key to return to the main menu.

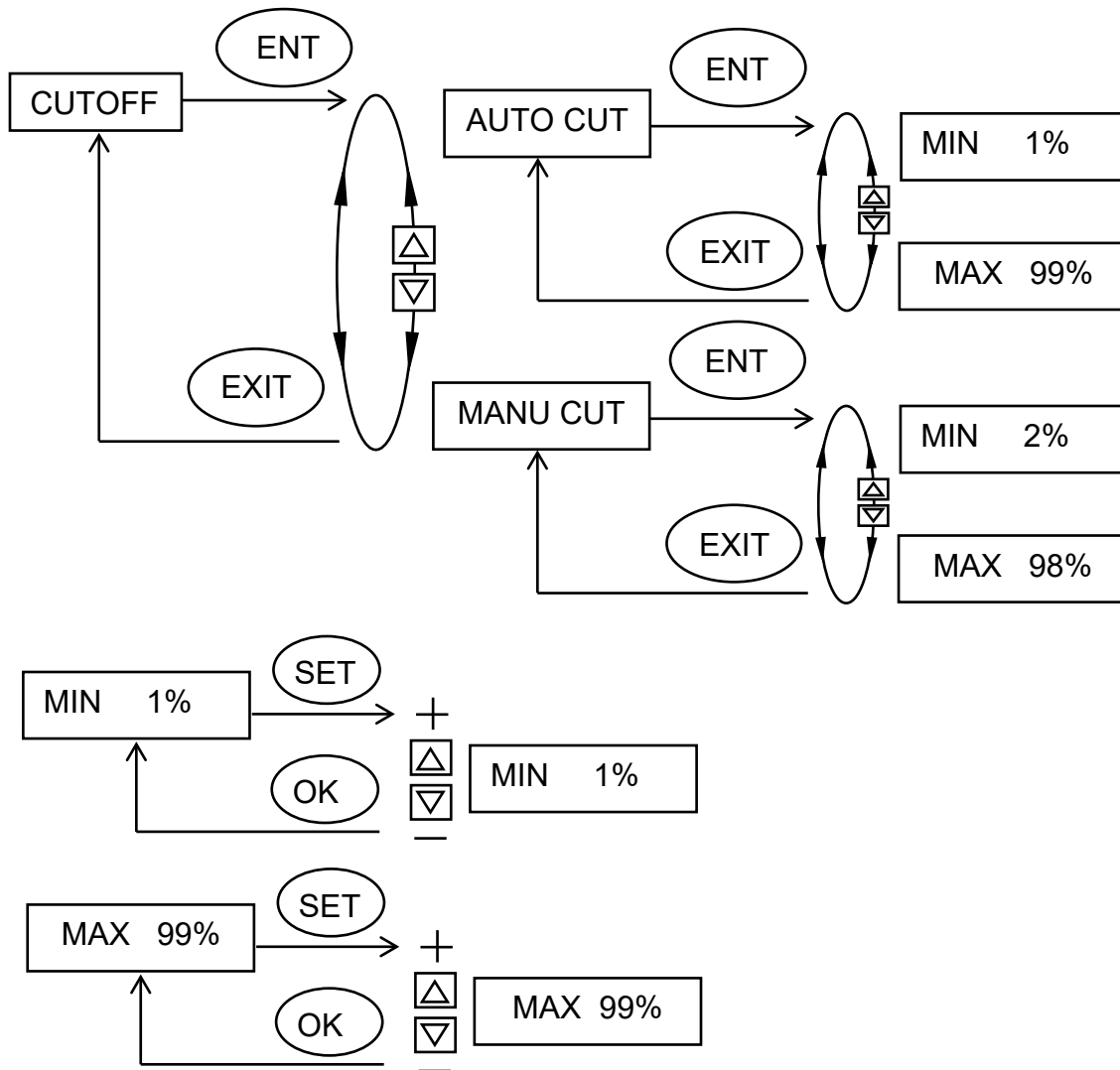


Figure 13. Operating sequence CUTOFF

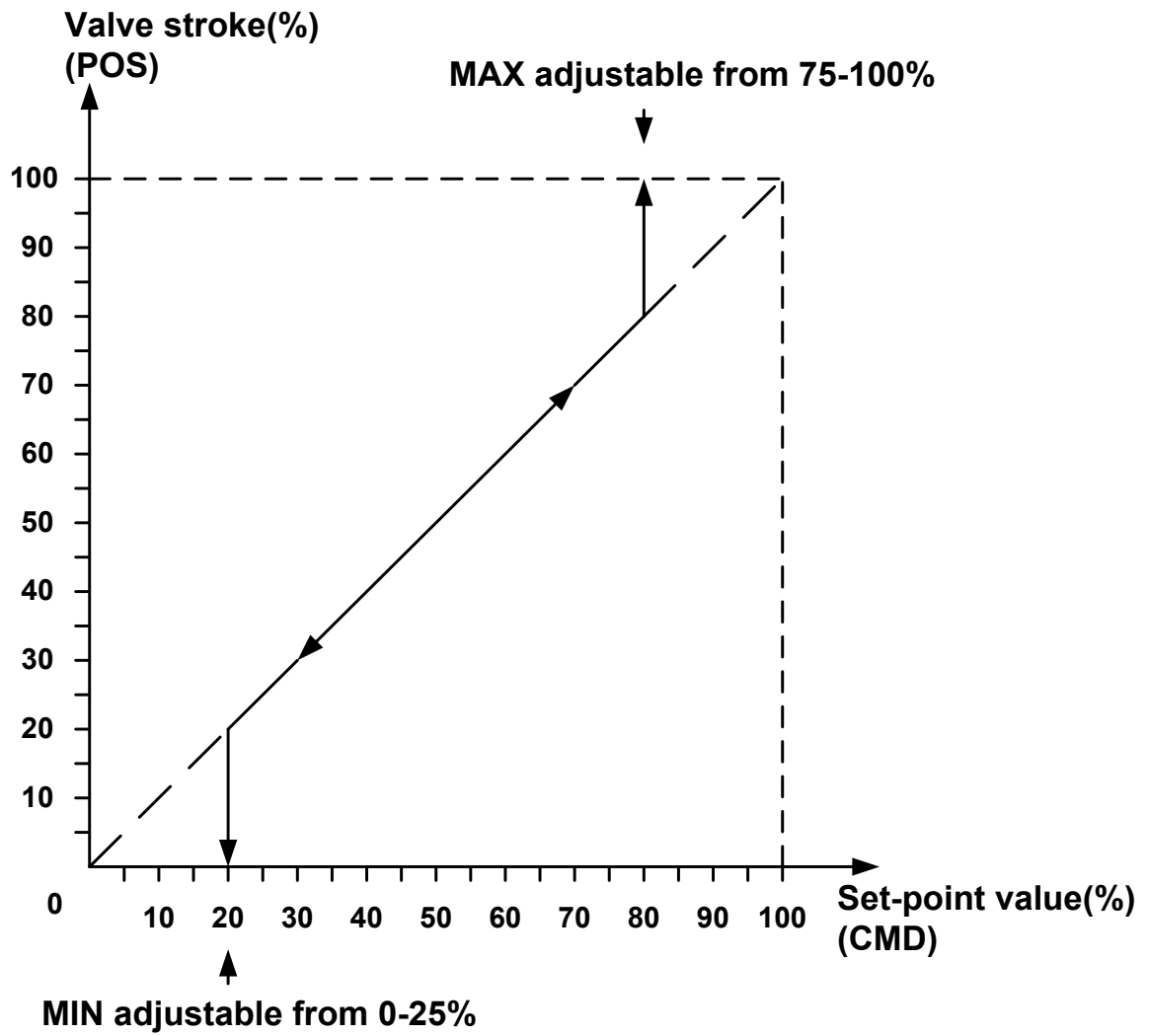


Figure 14. Graph CUTOFF

DIR CMD

Factory setting:
DIR CMD option: RISE

This function determines the direction between the input signal and the position set-point value (CMD).

RISE: 0/4 mA → 0%, 20 mA → 100%. (Opens with increasing signal)
FALL: 0/4 mA → 100%, 20 mA → 0%. (Closes with increasing signal)

Use the arrow keys to scroll to DIR CMD and press the ENT key to open the selection menu. Use the arrow keys to navigate to a specific function. Use the SEL key to set the desired feature. Press the EXIT key to return to the main menu.

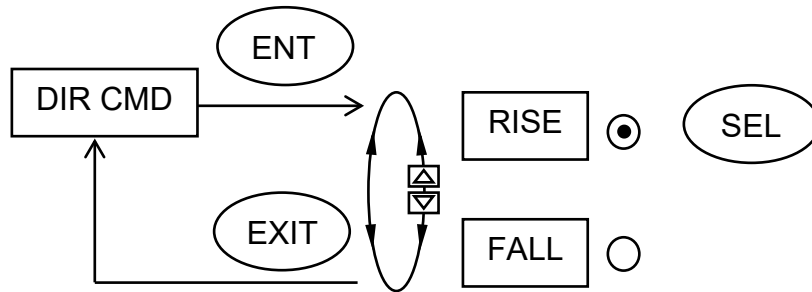


Figure 15. Operating sequence DIR CMD

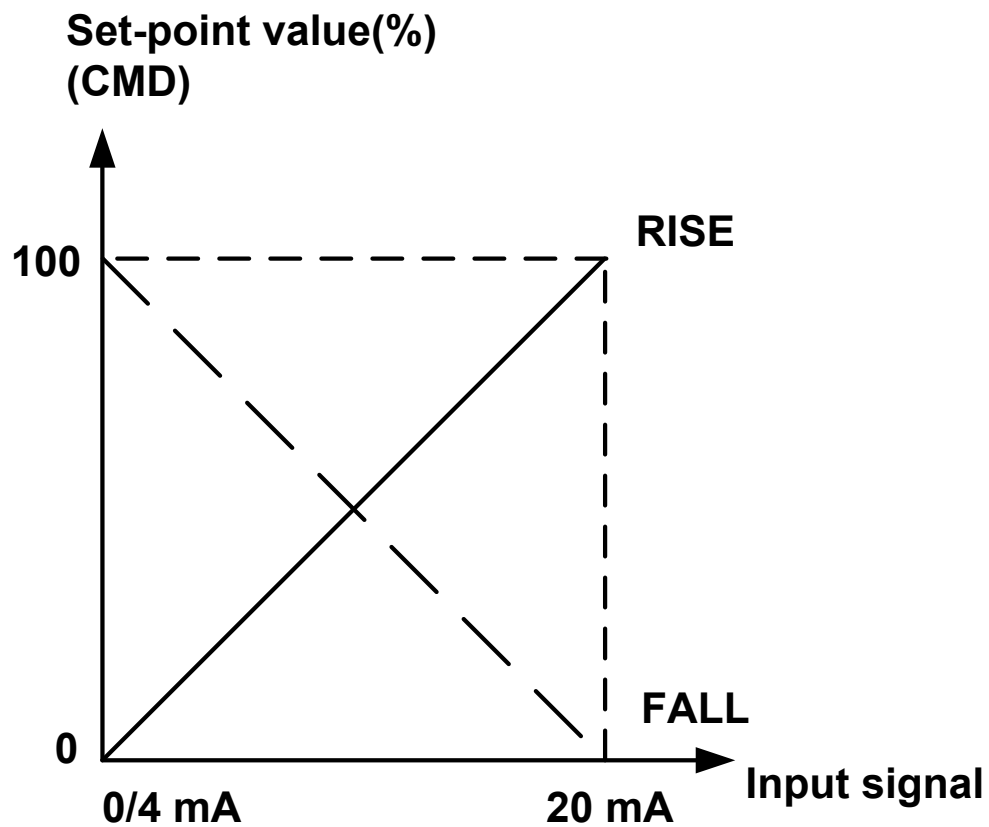


Figure 16. Graph DIR CMD

LIM STROKE

Factory setting:

LIM STROKE MIN value: 0% (unlimited)

LIM STROKE MAX value: 100% (unlimited)

This function limits the range of the total valve stroke.

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

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

***The minimum allowable gap between MIN and MAX is 50% of the total physical stroke.**

Use the arrow keys to scroll to LIM STROKE and press the ENT key to open the selection menu. Use the arrow keys to navigate to a specific function. Use the SET key to set the desired feature. Click the arrow keys to adjust. Press the OK key to save and the EXIT key to return to the main menu.

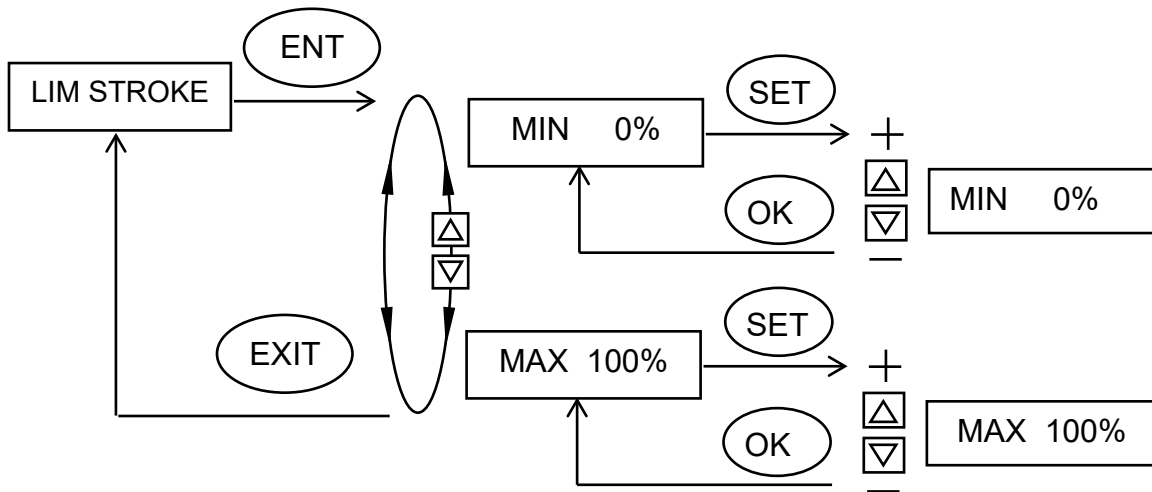


Figure 17. Operating sequence LIM STROKE

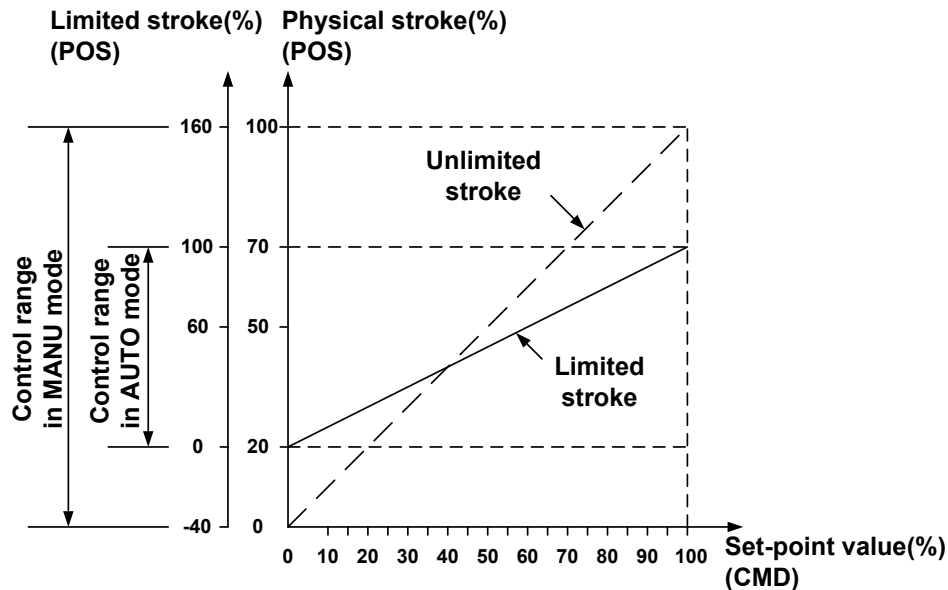


Figure 18. Graph LIM STROKE

NOTE: After setting the limit value, the value of valve stroke (POS) on the display may be bigger than 100% or smaller than 0%. Do not set the gap between MIN and MAX smaller than required in the application, since it may result in instability. Decreasing the gap between MIN and MAX may require the AUTO DB value to be increased.

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 options. The automatic dead band value corresponds to limited scale of the valve stroke. The dead band range is 0.1%-10%.

Use the arrow keys to scroll to DEAD BAND and press the ENT key to open the selection menu. Use the arrow keys to navigate to a specific function. Use the SET key to set the desired feature. Click the arrow keys to adjust. Press the OK key to save and the EXIT key to return to the main menu.

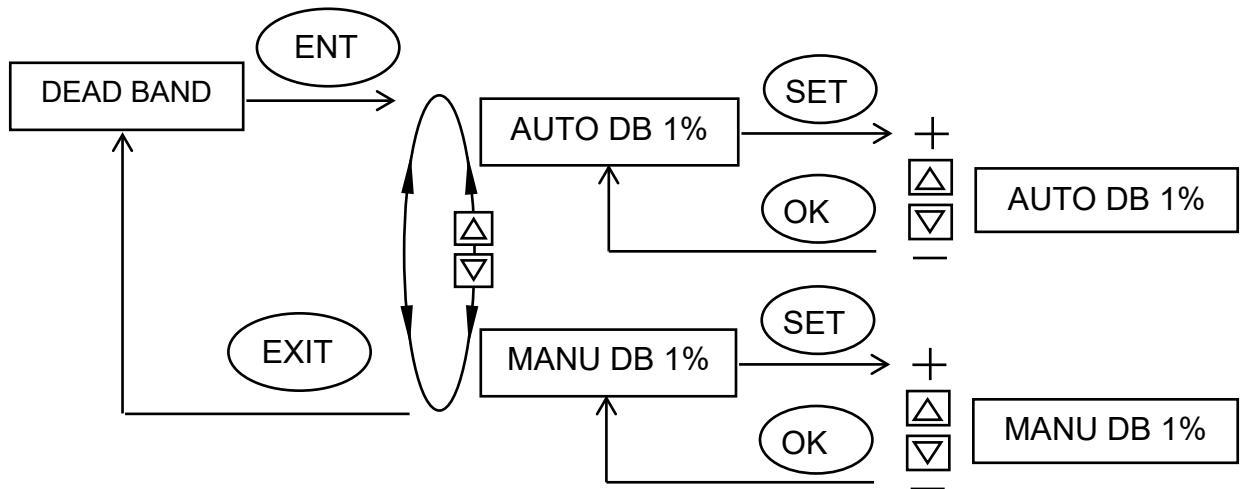


Figure 19. Operating sequence DEAD BAND

NOTE: The smaller the dead band setting, the higher the control accuracy. Do not set the DEAD BAND value smaller than required in the application, since it may result in instability.

SAFEPOS

Factory setting:
SAFEPOS value: 0%

This function is used to set a safety position which the valve stroke will default to under specified conditions. The safety position is initiated by an error signal for set-point value. When the adjustment for the safety position is enabled, the sign "safe pos" is displayed on the operating interface.

Use the arrow keys to scroll to SAFEPOS and press the ENT key. Use the SET key to set SAFEPOS %. Click the arrow keys to adjust. Press the OK key to save. Press the EXIT key to return to the main menu.

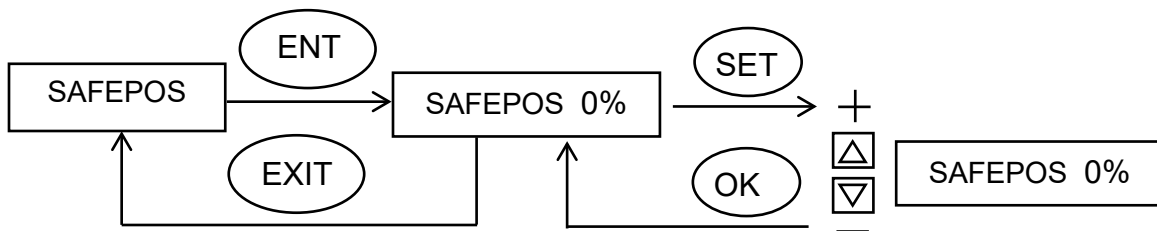


Figure 20. Operating sequence SAFEPOS

OUTPUT

Factory setting:
ANALOG option: POS
ANALOG TYPE option: 4-20 mA

This function is used to output an analog signal of the current position (POS) or of the set-point value (CMD). Two output signal types (4-20 mA, 0-20 mA) can be selected.

Use the arrow keys to scroll to OUTPUT and press the ENT key to open the selection menu. Use the arrow keys to navigate to a specific function. Use the SEL key to set the desired feature. Press the EXIT key to return to the main menu.

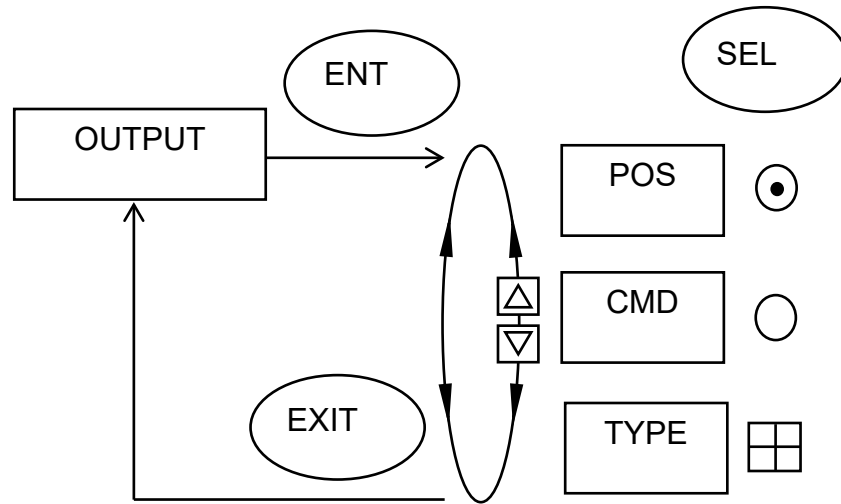


Figure 21. Operating sequence OUTPUT

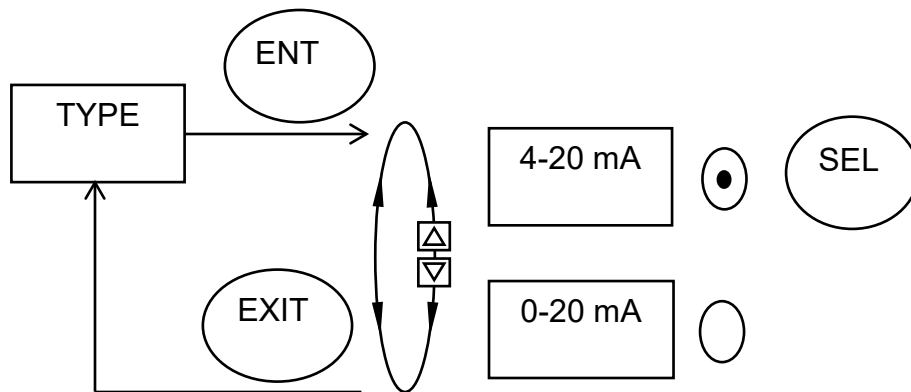


Figure 22. Operating sequence OUTPUT TYPE

SIG ERROR

Factory setting:

SIG ERROR option: ERROR OFF

SIG ERROR SAFEPOS option: CLOSE

This function is used to detect the loss of the input signal, but only for the 4-20 mA input signal option. The error condition results when input signal ≤ 3.5 mA. This condition occurs when SIG ERROR is enabled, and an error is detected. "ERROR" will be displayed on the operating interface.

To activate the SIG ERROR option, the user must first adjust SAFEPOS to desired percentage, as seen in Figure 20. After setting "SIG ERROR" to "ERROR ON" and "SAFEPOS" to "OPEN" and if an error condition is detected, the valve stroke will shift to the set SAFEPOS value.

Use the arrow keys to scroll to SIG ERROR and press the ENT key to open the selection menu. Use the arrow keys to navigate to a specific function. Use the SEL key to set the desired feature. Press the EXIT key to return to the main menu.

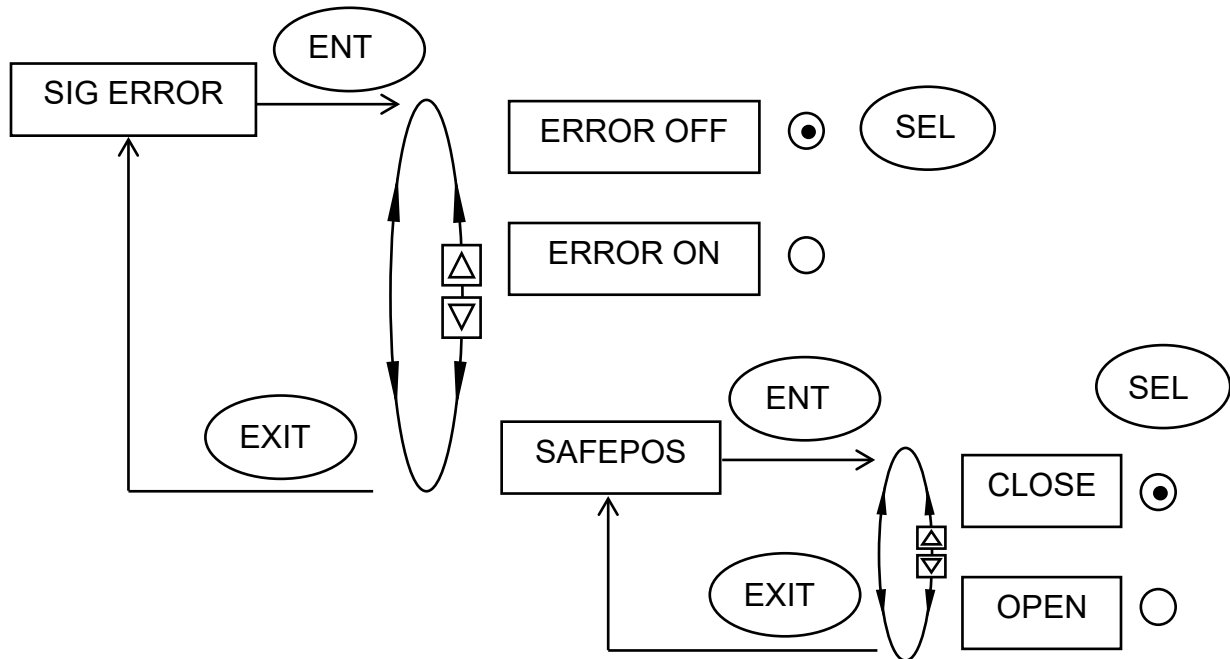


Figure 23. Operating sequence SIG ERROR

| 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 evacuated by selecting CLOSE and ERROR ON option when detecting the error signal. |

Table 7. Option SIG ERROR

MANU RATE

Factory setting:
GRADE: 2

This function is used for setting the adjustment rate for the 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.

Use the arrow keys to scroll to MANU RATE and press the SET key to open. Use the arrow keys to adjust the GRADE. Use the OK key to set the GRADE. Press the EXIT key to return to the main menu.

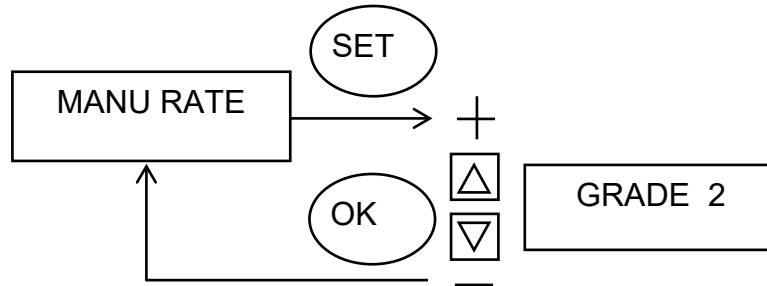


Figure 24. Operating sequence MANU RATE

CODE

Factory setting:
Code: 0000
Protect options: none

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

Use the arrow keys to scroll to CODE and press the ENT key to open. Use the arrow keys to input the code. Use the OK key to set the code and open the selection menu. Press the SEL key to set the code for desired feature. Press the EXIT key to return to the main menu.

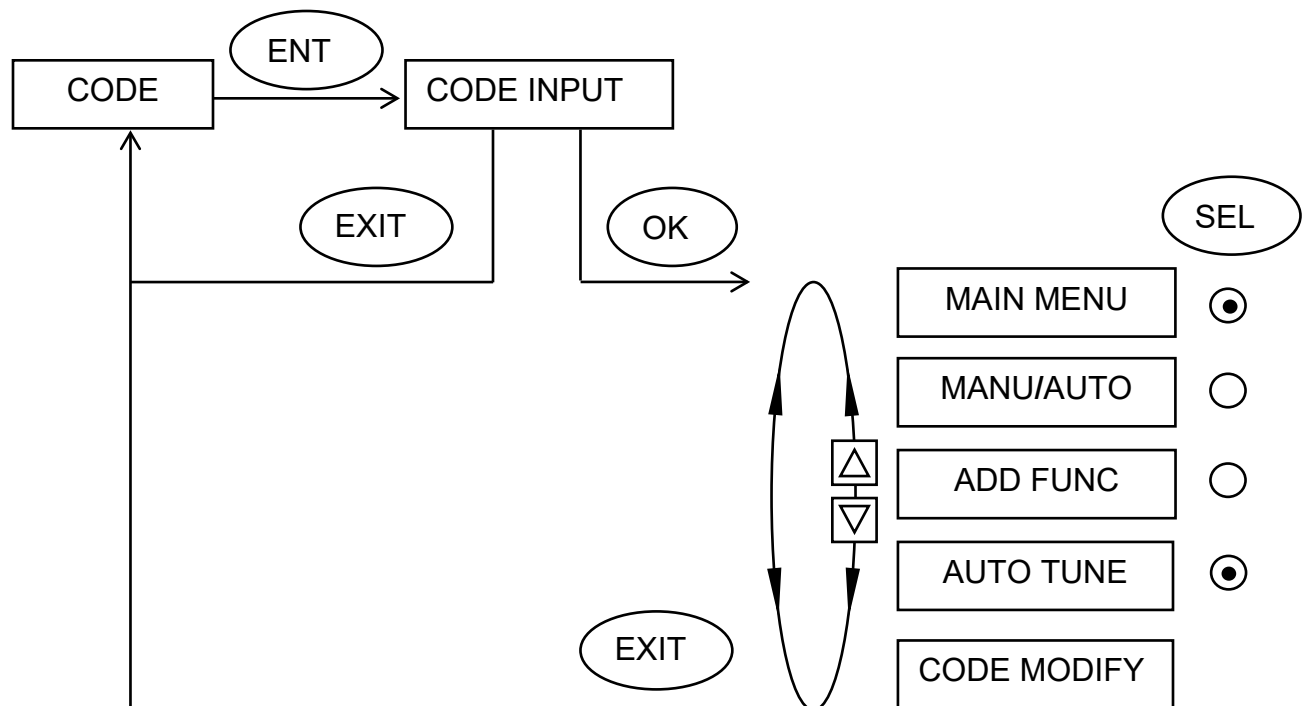


Figure 25. Operating sequence CODE

CODE Continued

| Option | 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 8. Option CODE

SET FACT

This function resets the parameters to the factory default setting except the parameters of AUTO TUNE and CAL USER.

Use the arrow keys to scroll to SET FACT and press and hold the RUN key for 3 seconds to reset the parameters.

Press for approx.3s

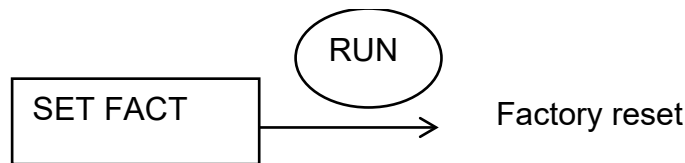


Figure 26. Operating sequence SET FACT

LANGUAGE

This function is used to select the interface language.

Use the arrow keys to scroll to LANGUAGE and press the ENT key to open. Use the arrow keys to navigate to a specific language. Use the SEL key to set the desired language. Press the EXIT key to return to the main menu.

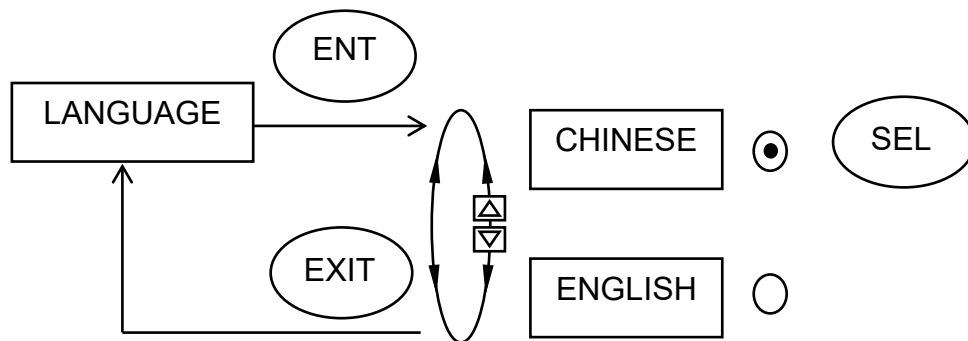


Figure 27. Operating sequence LANGUAGE

Advanced Functions

CAL USER

This function is not recommended for general users.

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 4-20 mA: 655

CAL INPUT MAX for 4-20 mA: 3277

CAL INPUT MIN for 0-20 mA: 0

CAL INPUT MAX for 0-20 mA: 3277

This function is used to calibrate the scale value for valve stroke and input signal.

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

Use the arrow keys to scroll to CAL USER and press the ENT key to open the selection menu. Use the arrow keys to navigate to a specific function. Use the ENT key to open the desired feature. Press the SET and the OK keys to set the values. Press the EXIT key to return to the main menu.

| Option | Description |
|-----------|--|
| CAL POS | Calibrating the scale values for valve stroke. When setting the MIN value, the actuator is fully closed 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 this option, the actuator is fully evacuated 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 9. Option CAL USER

When the system is running the CAL POS or CAL INPUT function, the user should watch to see if the lighted changing value remains stable. The stable condition occurs when the range of the changing value is less than 5 for an extended period of time. Once the stable condition is achieved, press the "OK" key on the display to record the current changing value as the new calibration value. The recorded value may be different from the previous recorded changing value.

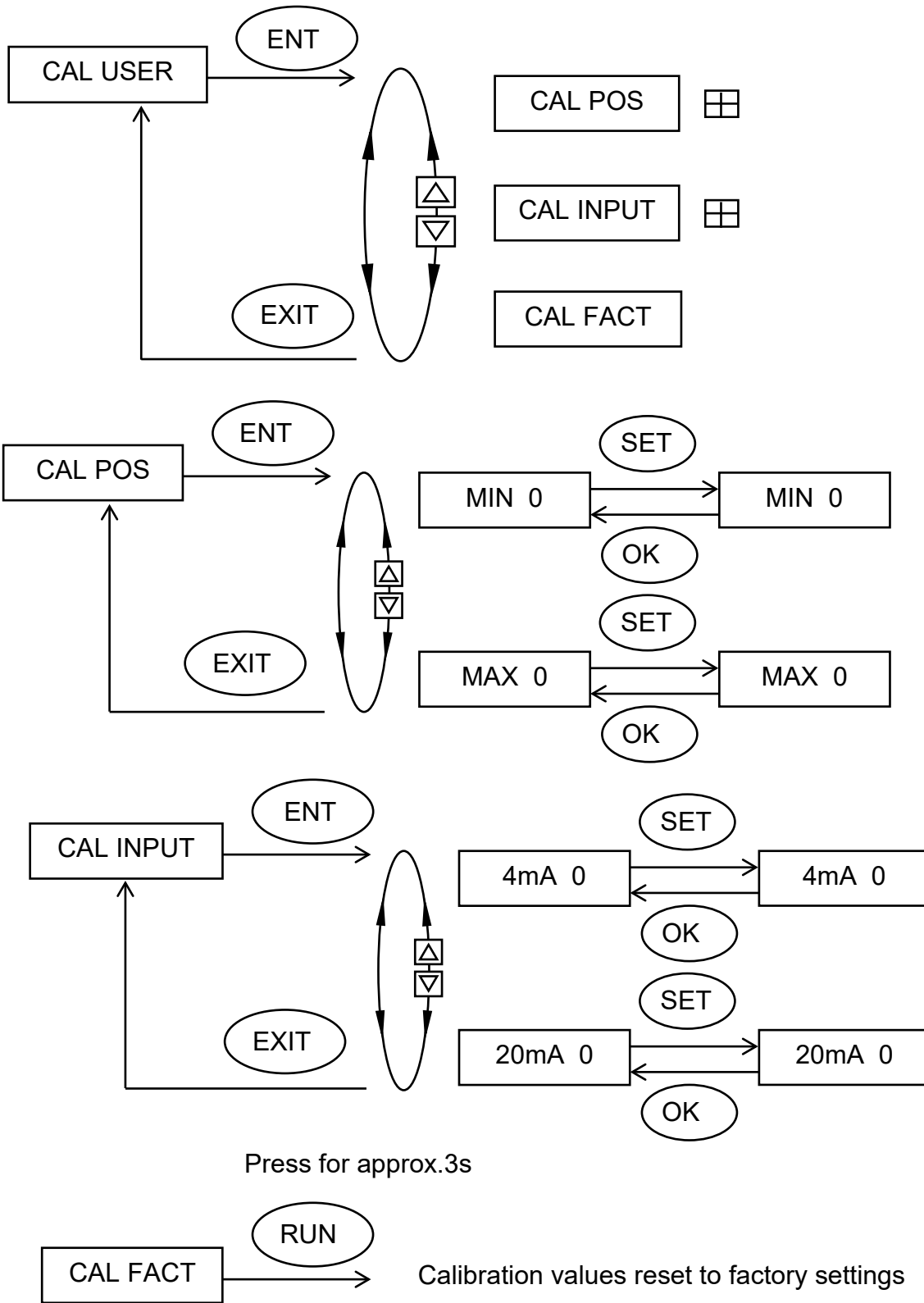


Figure 28. Operating sequence CAL USER

NOTE: Write down the current changing value before recording. The changing value to be recorded may be different than the value after being recorded. If the deviation between the two values is less than 3, the recorded value can be used, otherwise, please run the calibration for the related value again.

Technical Requirements

1. The power supply voltage of the positioner is 24V DC $\pm 10\%$. Please verify the power supply voltage before connecting the power cable to the electrical terminals.

CAUTION: Make sure that the power supply is disconnected before connecting the power cable. High voltage will damage the unit.

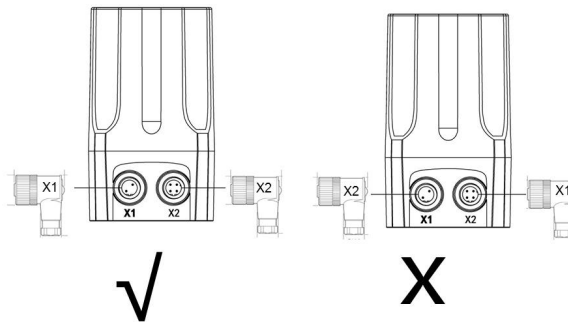
2. Air supply use specification

- a) The air pressure should be less than 101.5 psi (0.7MPa).

Install a 5-micron filter (filter regulator), prior to the air supply inlet of the positioner to prevent moisture or oil from entering. In the condition of highly lubricated air, it is recommended to additionally install a 3-micron oil separator in front of the air supply inlet of the positioner. It is suggested to use a filter regulator such as Parker model number P31EB92EGBBN5P.

3. Waterproof electrical connectors use specification

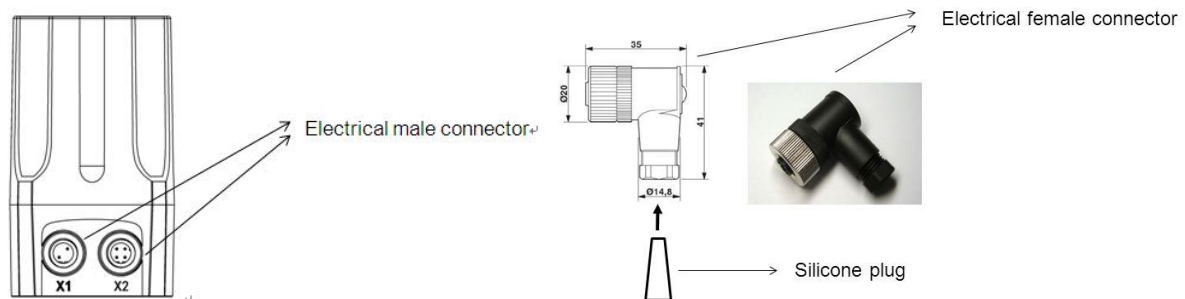
- a) The electrical connectors have keyed design. Please connect the electrical female connector with the electrical male connector of the positioner according to the sign X1 and sign X2. Excessive torque will damage the electrical male connector.



- b) The cable diameter which is compatible with the waterproof electrical connectors is PG7 (4mm-6mm). Please use the multi - core cable with external insulation, otherwise the electrical connectors cannot achieve IP66 protection class. Below shows the correct and incorrect methods of wiring the connectors.



- c) If the electrical male connectors are not used for a long time, please install silicone plugs in the female connectors and screw them into the male connectors to prevent water or corrosive gases from corroding the connector pins or entering the positioner inside. See pictures below.



Appendix

Mechanical Dimensions

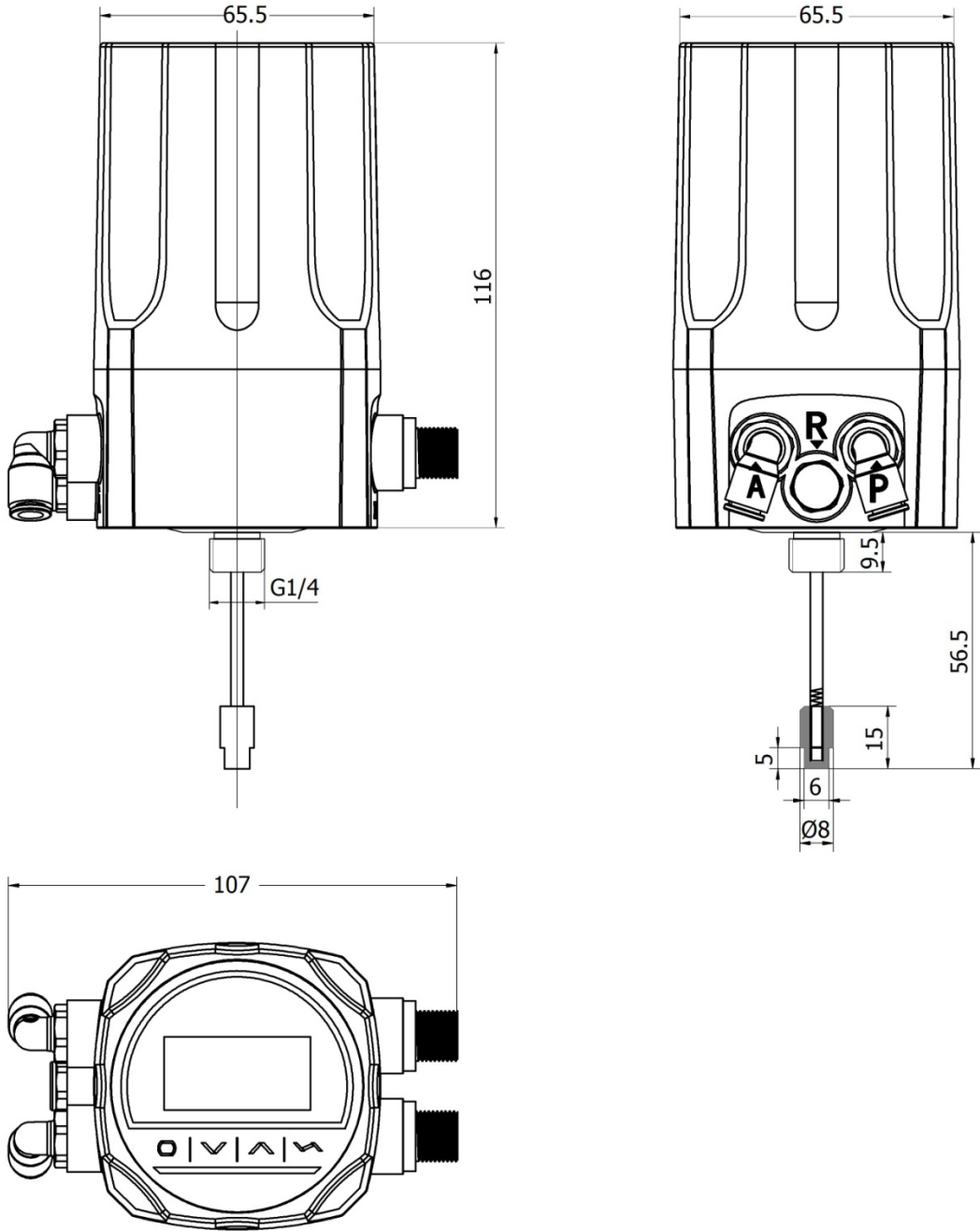


Figure 29. Mechanical dimensions

Positioner Replacement

WARNING: Failure to depressurize the system could result in injury. **Disassembly of the actuator is not required.** If the positioner is inoperable, contact Parker concerning replacement of the unit.

1. Depressurize the system.
2. Turn off supply voltage and signal to the positioner. Remove electrical connectors from positioner.
3. Ensure that the pilot air supply is turned off. Remove the pilot air supply line from port "P". Remove the actuator supply line from port "A".
4. Remove the pilot air supply line (tubing) from the positioner to the actuator housing.
5. Remove the positioner from the actuator housing by rotating the positioner counterclockwise.
6. Verify that the stroke range and the screw thread size of the replacement positioner matches that of the valve actuator housing.
7. Separately measure the C1 value when the valve is fully closed and C2 value when the valve is fully open with a depth gage. The values are the distance between the end of the stem and the machined face on the top of the actuator, as shown in Figure 31.

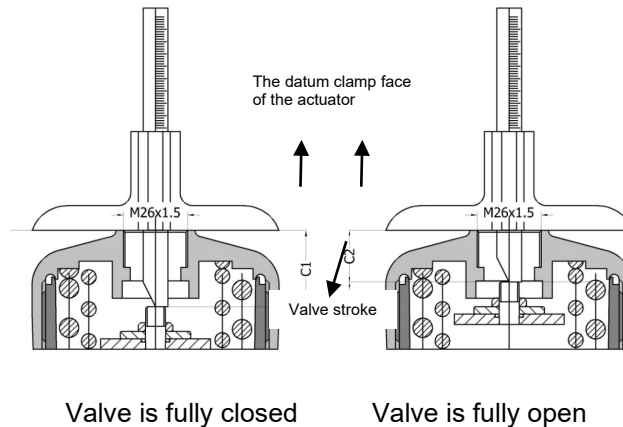


Figure 30. Actuator measurement

8. Adjust the adjusting nut of the displacement sensor. Then measure the D value, as shown in Figure 31, with a depth gage when the displacement sensor is completely loosened. Calculate the compression value $L1 = D - C1$, $L2 = D - C2$. It is recommended that the compression values L1 and L2 are both in the reference range shown in Table 10. If the L1 value or L2 value does not fall within the reference range, adjust the D value according to the actual situation.

NOTE: The adjusted D value must ensure that $L1 > 0$ and $L2 <$ the maximum compression value of the displacement sensor, otherwise, the positioner cannot match the valve actuator.

| Maximum valve stroke | D range | L1, L2 reference range |
|------------------------|------------------------------|-------------------------|
| 0.20~.98 in 5~25 mm | 2.22~2.46 in 56.5~62.5 mm | 0.12~1.10 in 3~28 mm |

Table 10. The reference range of the compression value

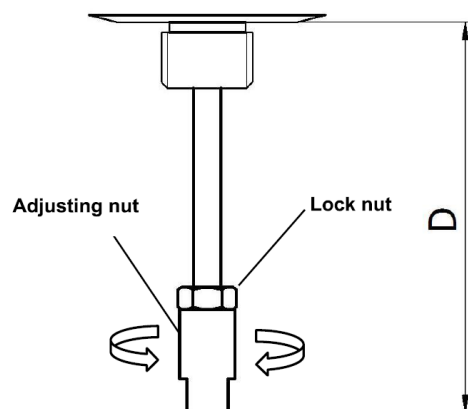


Figure 31. Displacement sensor adjustment and measurement

Positioner Installation

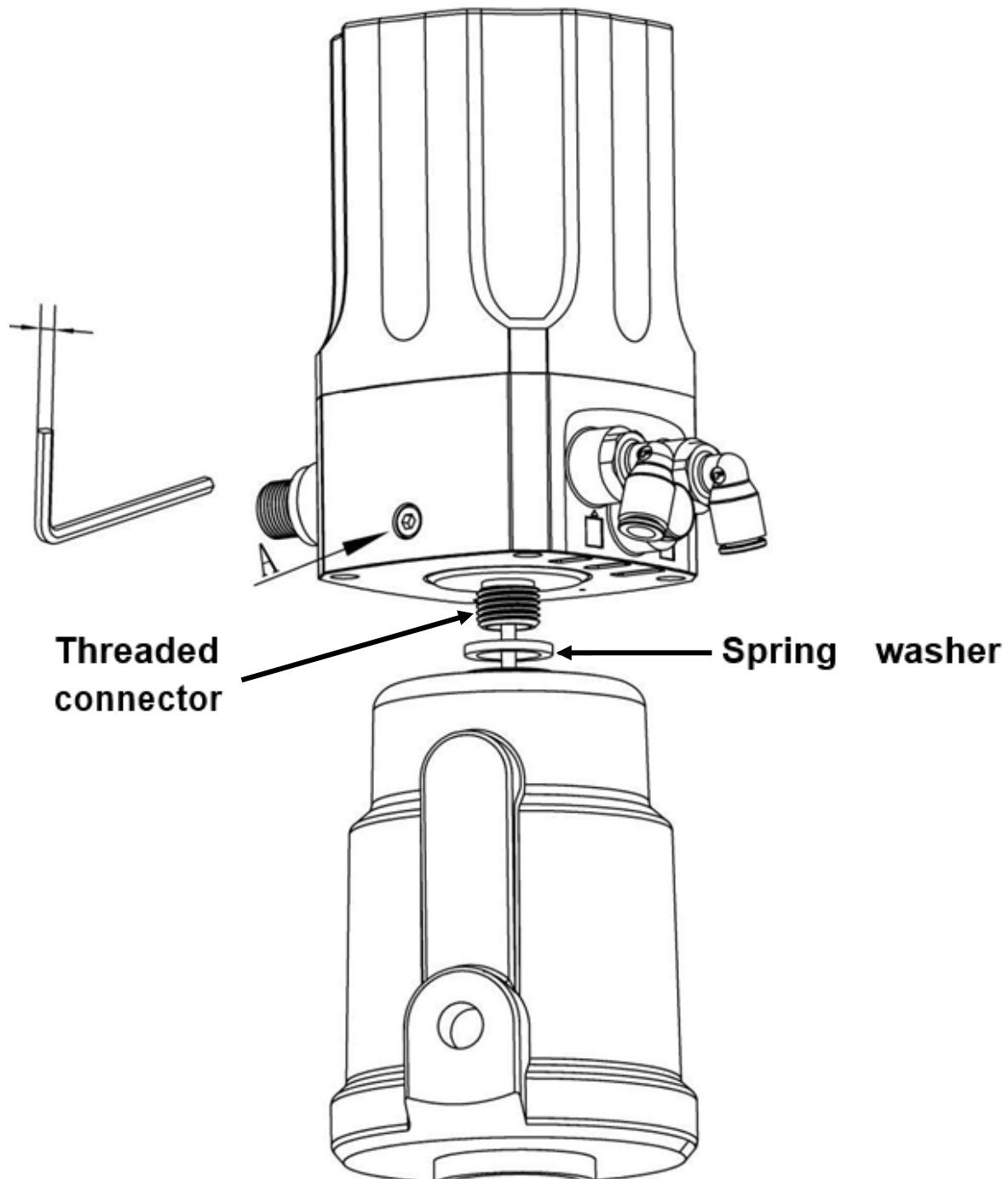


Figure 32. Displacement sensor adjustment and measurement

9. Use a 3 mm hex key wrench to tighten the screw at position A to tighten the positioner housing and the threaded connector.
10. Insert the spring washer into the bottom thread.
11. Screw the replacement positioner clockwise into the threaded connection of the actuator housing and tighten as shown in Figure 32.
12. After connecting the positioner to the valve actuator, the angle between positioner and valve can be adjusted. If you need to adjust the angle of the operation interface of the positioner, loosen the hexagon socket screw at position A as shown in Figure 32, you can rotate the main housing to the required angle in the range of 180° clockwise or counterclockwise shown in Figure 33, and then tighten the screw.

Rotation of Valve Positioner

The positioner housing can be rotated clockwise or counterclockwise within 180° range. This can allow for better access to make the electrical and pneumatic connections.

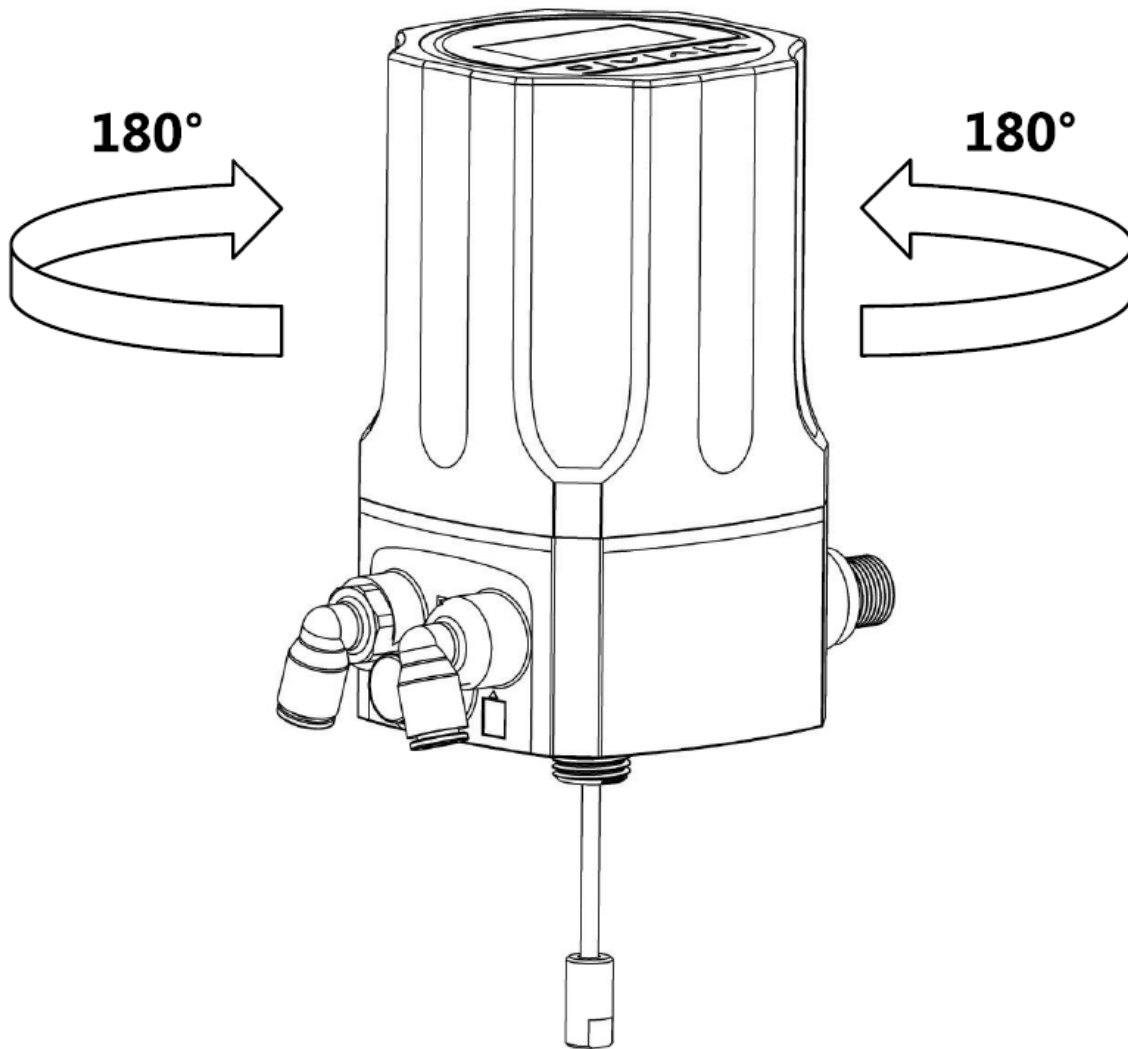


Figure 33. Positioner Rotation

NOTE: The positioner has a hard stop to prevent rotation. If it does not rotate in one direction, do not force rotation. Try rotating in the opposite direction.

NOTE: When rotating the positioner counterclockwise, any further rotation past the stop will loosen the positioner from the housing.

13. Reconnect the pilot air supply line to port "P" and the actuator supply line to port "A".
14. Reconnect the electrical connectors to the positioner.
15. Turn on pilot air supply, power supply, and signal.
16. Once the positioner is powered, navigate to the AUTO TUNE function to calibrate the valve and positioner.

Trouble Shooting

| TROUBLESHOOTING | | |
|--|---|---|
| PROBLEM | POSSIBLE CAUSE | PROCEDURE |
| Display does not illuminate after being powered. | <ol style="list-style-type: none"> 1. Incorrect voltage. 2. Electrical connectors are not fastened to positioner. | <ol style="list-style-type: none"> 1. Confirm 24V DC power supply. 2. Tighten electrical connectors to the positioner. |
| Actuator does not move. | <ol style="list-style-type: none"> 1. Pilot pressure is not present. 2. Pilot air supply is not connected to positioner housing. | <ol style="list-style-type: none"> 1. Check that pilot air supply is properly connected. 2. Connect pilot air supply to positioner housing. |
| Valve does not fully open. | <ol style="list-style-type: none"> 1. Pilot air supply is less than required. 2. Air leakage at pneumatic connections. | <ol style="list-style-type: none"> 1. Verify that pilot air supply meets the minimum pressure required to actuate the specific angle seat valve model number. Refer to values on actuator housing. 2. Tighten the pilot supply and actuator connections on the positioner. Tighten actuator connection on actuator housing. |
| Actuator does not move right up to stop (at 20mA). | <ol style="list-style-type: none"> 1. Pilot pressure is too low. 2. Positioner is not adjusted correctly. | <ol style="list-style-type: none"> 1. Increase pilot supply to required value on actuator housing. 2. Readjust position sensor. |
| In stationary automatic operation (constant set point signal) the positioner internal solenoid valves continue to operate. | <ol style="list-style-type: none"> 1. Leak in connection from positioner to actuator. 2. Leak in actuator. | <ol style="list-style-type: none"> 1. Find leak and correct. 2. Consult factory. |
| Internal positioner solenoid valves are not operating. | <ol style="list-style-type: none"> 1. Faulty solenoid valve connections (internal). 2. Contamination (particles) in the (internal) solenoid valves. | <ol style="list-style-type: none"> 1. Consult factory. 2. Consult factory. |
| Valve positions not reached correctly. | <ol style="list-style-type: none"> 1. Positioner is not adjusted correctly. | <ol style="list-style-type: none"> 1. Run self-adjustment. |
| Positioner does not reach setpoint | <ol style="list-style-type: none"> 1. Value of LIM STROKE or DEAD BAND are too small. | <ol style="list-style-type: none"> 1. Adjust LIM STROKE and DEAD BAND values until steady state is achieved. |