Installation, Operation and Maintenance Manual

PROVAL A236 Series

Smart Valve Positioners

1 Information for the Operator

Please read this manual carefully before starting work!

1.1 Classification of Safety Related Notices

Ensure that you are safe in installing, commissioning and maintaining this instrument. Please pay attention to the warning and notice texts.

WARNING

Potentially hazardous situation!

Non-observance could result in serious injury!

NOTICE

Hazardous situation!

Non-observance may result in minor or moderate injury!

NOTE

Important information in order to understand the machine for optimized operation !

1.2 Safeyand Cautions

NOTE

1. The design of this equipment meets the advanced safety requirements，and it is safe and effective when the factory is tested out of the factory。

2. This equipment is complied with the relevant rules and standards。

3. The equipment manufacturer reserves the right to modify technical parameters without prior notice。

4. The permitted storage transport and operating temperature must be observed。

5. The equipment must be connected in accordance with the connection diagram in the manual。

6. The information contained in the nameplate、wire connection diagram and warning icons attached to the equipment must be followed。

7. There are corresponding marks on the nameplates of equipment used in hazardous areas. When operating equipment in a hazardous area, the relevant rules must be complied with. The installation specifications, connection parameters, and safety instructions provided in the Ex flameproof document must be complied with.

1.3 Use as intended

NOTE

1. The use may constitute a risk to life and limb of the user of third parties,or cause damage to the machine and to other material property in the event that use as not intended, this is not allowed.

2. The manufacturer will not responsible for damage caused by improper operation or used as not intended.

1.4Install and Maintain Operation

NOTE

1. Installation, commissioning, operation, maintenance and repair of the instrument requires special knowledge and should be performed only by qualified personnel.

2. For installing this instrument, the operator must read the user's manual and comply with the rules.

3. When the instrument is installed, it should be in the state of power off and no external load is overstressed.

4. The instrument must not be modified or repaired unless the user is according to the manual.

5. Repairs that are not described in the supplied operation manual may only be carried out directly by the manufacturer or by the service organization.

6. If the welding operation is carried out near the equipment, the grounding of the welding equipment must not be carried out through this equipment.

1.5List of Delivery

A236 smart valve positioner.

User's manual

Ordered spare parts（Optional）

2Summary

A236 smart valve positioner is a two-wire system instrument. The positioner is a control accessory of pneumatic valve. It is widely used in automatic control systems of petroleum,chemical, electricity, metallurgy, paper and pulp industry and other fields.

A236 smart valve positioner accepts the 4~20mA valve setting analog signal from the control system.

This valve setting value will be converted by an analog to digital converter (ADC) to digital signal then input to CPU. At the same time, instrument gets the actual valve position from location sensors. The two signals are compared by the instrument software so as to control the intake and exhaust of the pneumatic actuator, and drive the valve to reach setpoint (refer to Figure2-1)

A236 smart valve positioned is based on microprocessor technology. It can overcome friction and the imbalance power on the control valve well, and improve the response speed of control valve, which makes the position set rapidly and accurately. It is not only able to completely substitute conventional valve positioner, but also is able to directly access HART network, exchanging information between

control system and positioner.

A236 smart valve positioner is complied with the IEC60079-0:2017Explosive atmospheres - Part 0:Equipment - General requirements and Explosive atmospheres - Part 11: Equipment protection by

intrinsic safety "i". A236 smart valve positioner is complied with Electrical apparatus for use in the

presence

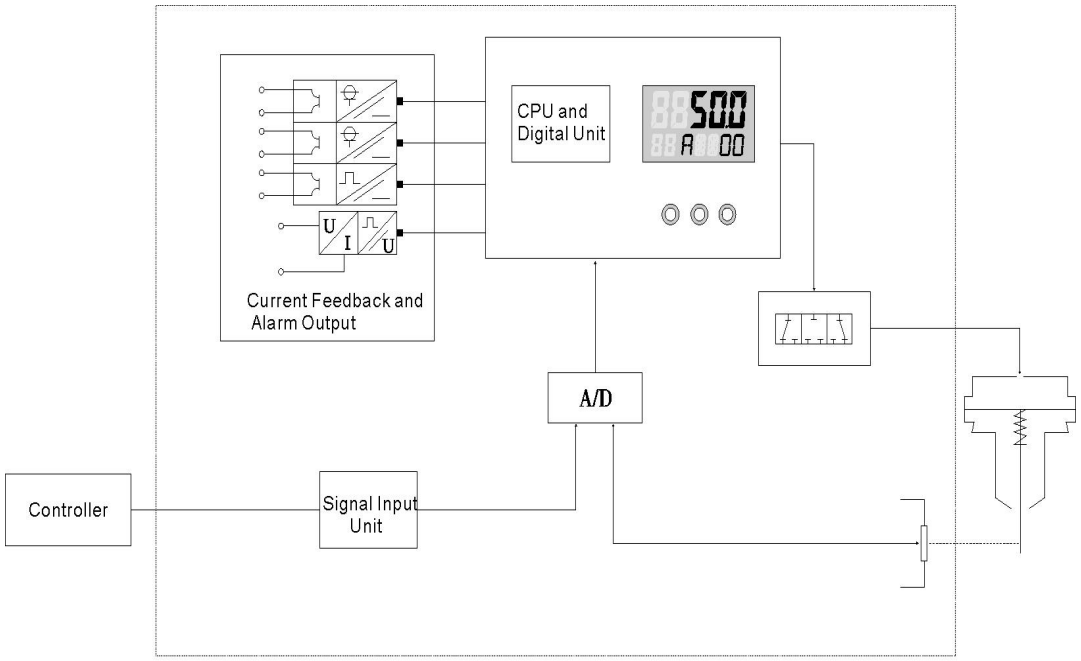


Fig2-1 A236 Valve Positioner Principle

2.1 Functions

Self-adaption function: automatically set the Zero and Span of control valve, and optimize the control parameters to improve the control precision.

Configuration function: valve characteristic curve, action mode, dead band, stroke range, shut-off value, and alarm events.

Self-diagnosis function: show the value of setpoint current, travel time, and dead band.

Fault mode function: fail safe (function open/close) or fail freeze (function hold).

Communication function: HART communication protocol.

Feedback function: 4~20mADC valve position feedback signal, switch valve feedback signal.

2.2 Specialty

Positioning precision: 0.5%F.S.

The operation does not need to open the cover.

Simple and compact design, modular construction

Automatic initialization, automatic diagnosis, dynamic setting of valve characteristic curve

Less components, better anti-vibration performance

Local or remote parameters configuration

Less power and air consumption, less operation cost for customers.

Two-wire supply in 4-20mA standard

The integrated lightning protection module can be selected to reduce the damage probability of the locator due to the surge of lightning

2.3 Integrated lightning protection circuit

With the development of technologies, the smart valve positioner becomes more intelligent with communication bus technology. Therefore, it is inevitable to use a number of highly integrated components, which will depress the performance of overcoming overvoltage, over current and anti-surge. When lightning coming, these components can be easily damaged, which will lead to positioner failure. If the control valve is use for critical process control or on high reliability position, the lightning may cause production out of control or accident because of the sudden failure of the positioner. Normal smart valve positioner is easy to be damaged by lightning. It is dangerous for production activities. In order to solve this problem, A236 has surge protection function by a built-in surge discharge circuit.

NOTE

1. The lightning protection function is an optional function;
2. It must be grounded according to relevant standards, when installing the lightning protection positioner.

3 Technical Data

Pneumatic	Supply Air Pressure	0.14～0.7 MPa
	Valve Leakage	<0.6L / H
	Air Consumption	<36L / H
	Air Supply	According to ISO8573-1 Size and density of particulates: Class 4 Oil concentration: Class 4 Dew point: Class 4 or 10K below operating temperature
Input/Output	Actuator	Single acting, Double acting
	Travel Range	Linear: 10~100mm(10-20mm,1:6 transmission ratio is optional); Rotation angle:30~105º
	Input Current	4~20mADC,Minimum input current:>3.8mA,split range start and end point adjustable
	Feedback Output	4～20mA DC
	Digital Input	1 dry contract
	Digital Output	Electronic switch:2 channel
	Piezo Valves Switch Time	Average failure free time: >2billion
	Output Characteristic	Linear, 1:30, 30:1, user defined (20points)
	Communication	HART
Display	LCD	2×7 digitals, dimension:22×38mm
	Pressure Gauge	Optional, displaying the in and out pressure
Operate	Self Tuning	Automatic calibrate the Zero and Span, dead band
	Self Diagnose	Show the value of input current , travel time, dead band, etc.
	Manual	3 keys on the front panel
Precision	Dead Zone	0.1~10%adjustable
	Linearity	≤±0.5% FS
	Hysteresis	≤0.5% FS
Environment	Ambient Temperature Range	General type:-(40~80)°C
		Intrinsic safety: -40~+50°C(T6) /65°C(T5) /80°C(T4)
	Relative Humidity	5～95%RH
	Vibration Resistance	15～150Hz@2g
	IP Protection Level	IP65（According to customer needs）
	Explosion-Proof Type	Exia IIC T4~T6 Ga, Exia D 20 T80/T95/T130
Appearance	Weight	2 .0 kg
	Dimension	170×96×92mm
	Housing Material	Aluminium Die casting

4 Installation

4.1 Dimensions

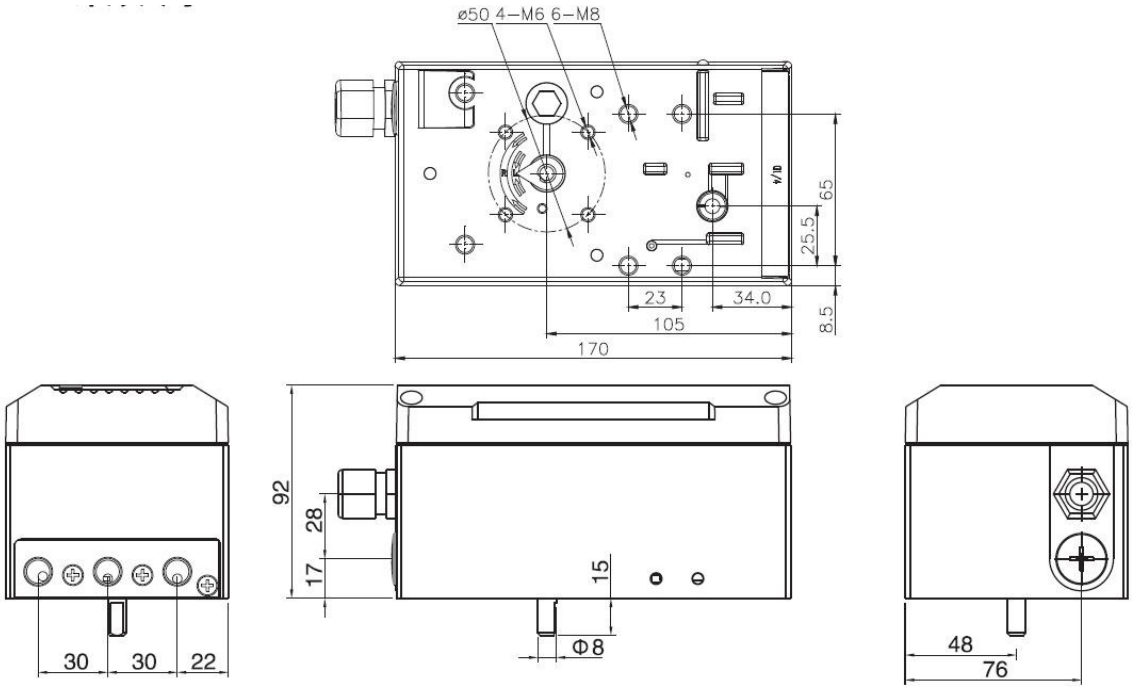


Fig 4-1 A236 Dimensional drawing

4.2 Installation

4.2.1 General

Fig. 4-2 shows the positioner feedback indicator and the arrow which indicate the rotating range. The shown position is the middle position of the rotating range. Without initialization, the LCD feedback value should be about 50.0 and the bottom row displays NOINI. The two dotted lines are the limit positions of the feedback rotating range in normal status. The position sensor was adjusted before out of factory.

Fig.4-3 is the image which shows that positioner is mounted on a linear actuator with standard feedback lever. The recommended feedback angle is from 40° to 60°on a linear actuator.

Fig. 4-4 is the image which shows that positioner is mounted on a rotary actuator with standard feedback lever

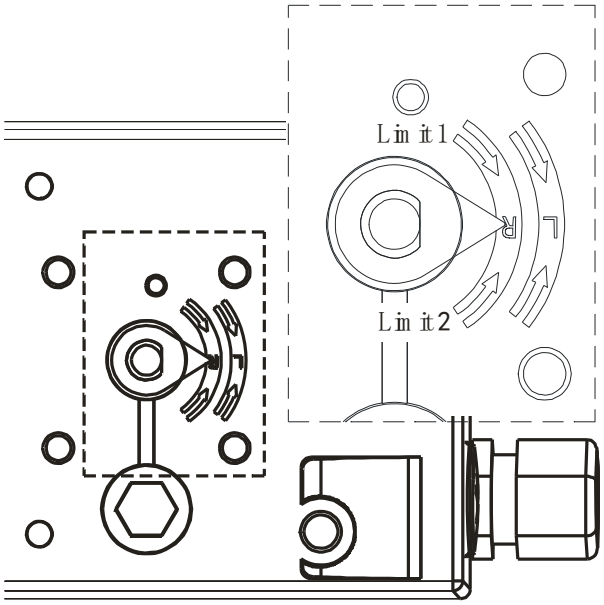


Fig 4-2

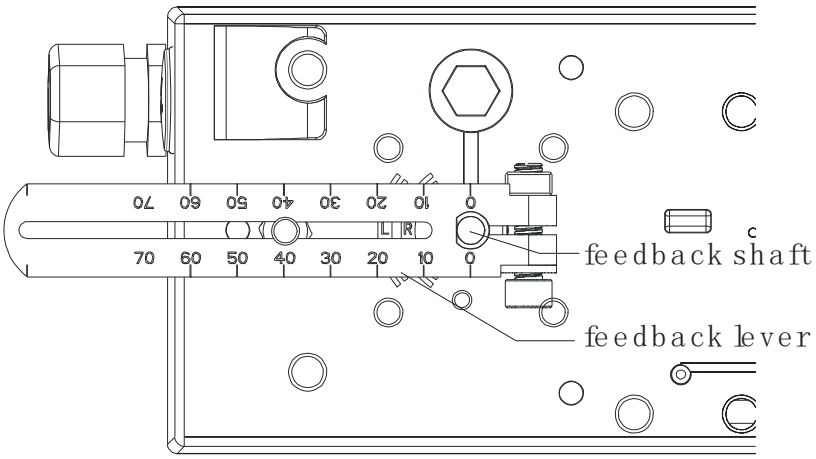


Fig 4-3

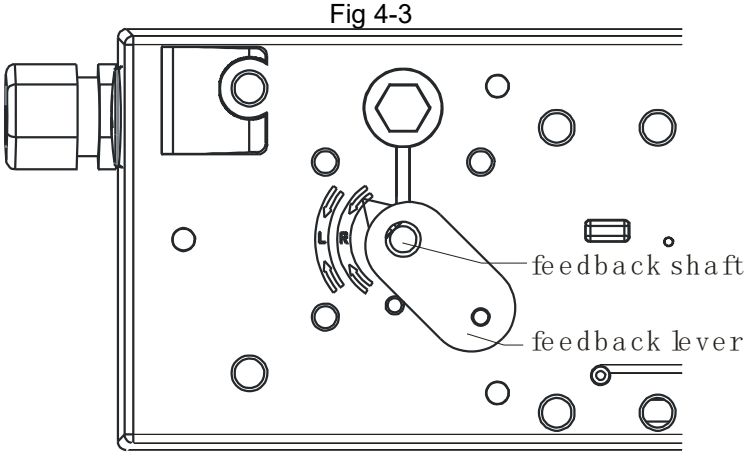


Fig 4-4

4.2.2 Installation on a linear actuator

Number	QTY	Name	Specification
1	6	Inner-hexagon head screw	M8x12
2	6	Spring washer	D8
3	6	Washer	D8
4	1	Actuator bracket	
5	1	Positioner bracket	
6	2	Inner-hexagon head screw	M6x12
7	2	Spring washer	D6
8	2	Washer	D6
9	1	Feedback bracket	
10	1	Feedback lever	
11	2	Screw with washer and spring washer	M5 x10

Note：1. Optional Modules;

2. If the threaded hole just on the left of the actuator, so the positioner bracket screw in the left of the positioner.

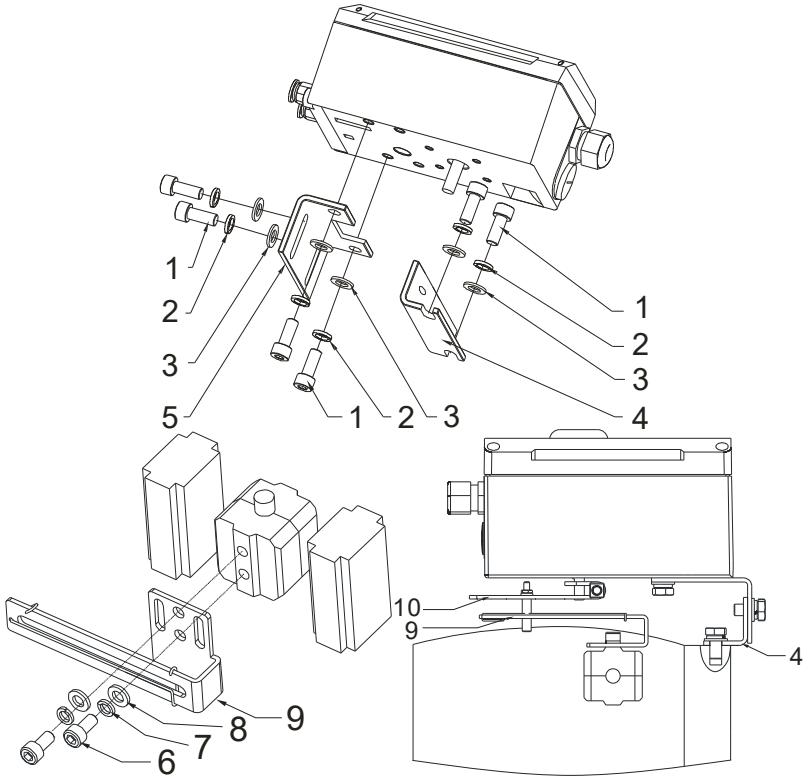


Fig.4-5 Installation on a linear actuator

The positioner mounting on the front of the actuator, with the adjustable connection by the feedback lever and feedback bracket(Fig. 4-5).

The installation steps as followings:

Fix the positioner bracket (Fig. 4-5/⑤) to the positioner with inner-hexagon head screws(Fig. 4-5/①),

spring washers (Fig. 4-5/②) and washers (Fig. 4-5/③).

Fix the actuator bracket (Fig. 4-5/④) to the actuator with inner-hexagon head screws(Fig. 4-5/①), spring washers (Fig. 4-5/②) and washers (Fig. 4-5/③).

Fix the feedback bracket (Fig. 4-5/⑨) to the actuator with inner-hexagon head screws(Fig. 4-5/⑥), spring washers (Fig. 4-5/⑦) and washers (Fig. 4-5/⑧).

Fix the feedback lever (Fig. 4-5/⑩) to the feedback shaft of positioner through fasten screw.

Fix the positioner to the actuator with inner-hexagon head screws(Fig. 4-5/①), spring washers (Fig. 4-5/②) and washers (Fig. 4-5/③).

After installation, please fine-tune the position of the actuator bracket (Fig. 4-5/④) and feedback bracket(Fig. 4-5/⑨) to make sure that the feedback lever(Fig. 4-5/⑩) is horizontal when the valve is 50% opened. See the solid line in Fig. 4-5.

For a linear actuator, the travel angle of the feedback lever should be from 40° to 60°. If beyond this range, it will cause significant nonlinearity errors.

4.2.3 Installation on a rotary actuator

Item	QTY	Name	Specification
1	4	Washer	D6
2	4	Spring washer	D6
3	4	Hexagon head screw	M6×10
4	1	Feedback lever	
5	1	Screw	M4×5
6	1	Positioner bracket	
7	2	Actuator bracket	
8	1	Feedback bracket	
9	1	Hexagon head nut	M6
10	4	Hexagon head screw	M5×10
11	4	Spring washer	D5
12	4	Washer	D5
13	4	Hexagon head screw	M5×10
14	4	Spring washer	D5
15	4	Washer	D5

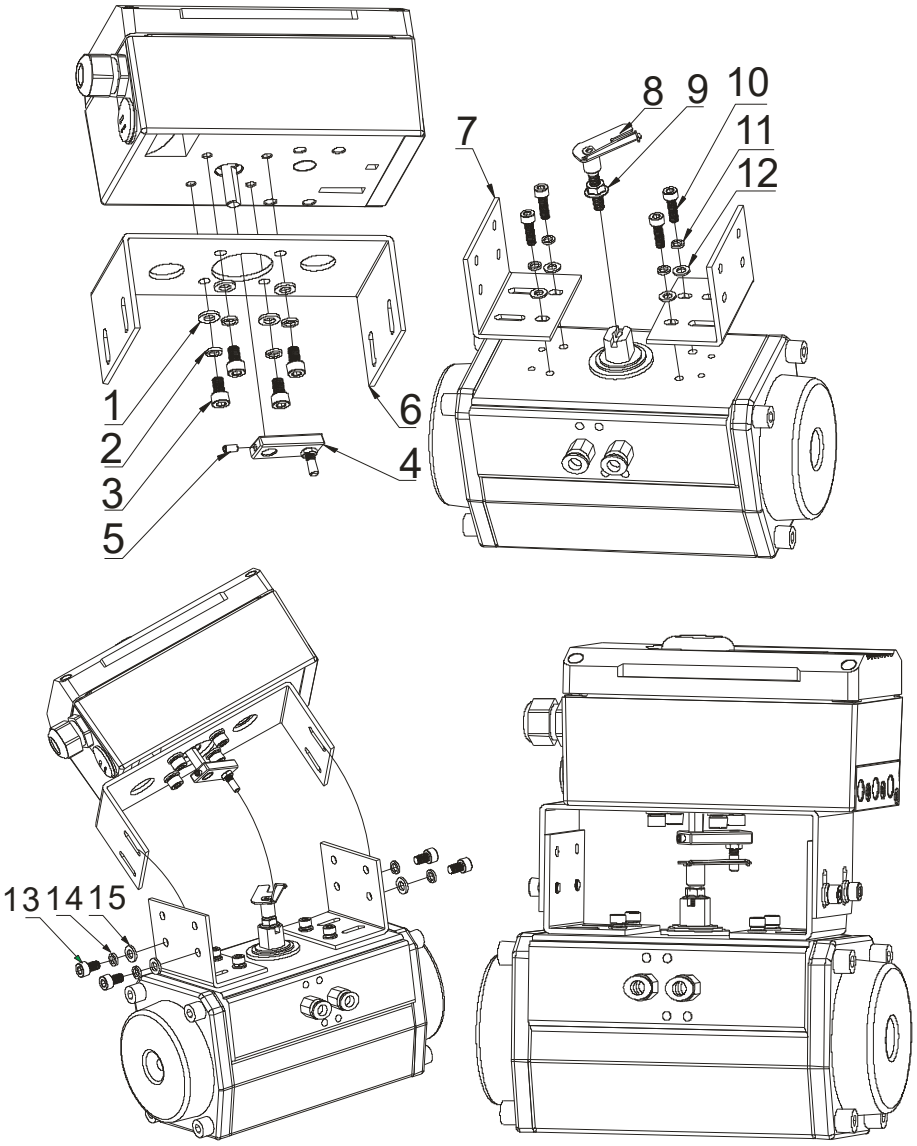


Fig.4-6 Installation on a rotary actuator

The installation steps as followings ((Fig. 4-6):

Fix the positioner bracket (Fig. 4-6/⑥) to the positioner with hexagon head screw (Fig. 4-6/③), spring washers (Fig. 4-6/②) and washers (Fig. 4-6/①).

Fix the feedback lever (Fig. 4-6/④) to the shaft of actuator through hexagon head nut(Fig. 4-6/⑤).

Fix the actuator bracket (Fig.4-6/⑦) to the actuator with hexagon head screw (Fig.4-6/10), spring washers (Fig.4-6/ ⑪) and washers (Fig.4-6/ ⑫)

Screw in hexagon head nut (Fig.4-6/⑨) to feedback lever (Fig. 4-6/⑧), screw in the feedback lever to the actuator and fasten it with the hexagon head nut (Fig.4-6/⑨).

Put the positioner carefully on the actuator. The pin of the feedback lever (Fig. 4-6/④) should be in the slot of the feedback lever (Fig. 4-6/⑧). Adjust the height of the positioner, fasten the screw on the pin of the feedback lever (Fig. 4-6/④) and fix the positioner with hexagon head screw(Fig. 4-6/13), spring washers (Fig. 4-6/14) and washers (Fig. 4-6/15). Adjust the rotate angle of the feedback lever to comply to the requirements in §4.2.1.

NOTE

1、 Do not cover the exhaust with the mounting bracket.

2、The feedback lever should comply to the requirements in §4.2.1 for the rotary actuator.

3、The feedback lever is horizontal when the valve is 50% opened for the linear actuator.

4.3 Pneumatic Connection

Pneumatic connection is on the right side of the positioner. Positioner provides two kinds of connection type: G1/4 or NPT 1/4 (refer to ordering data). See the specific marks on the housing and choose correct type according to the marks.

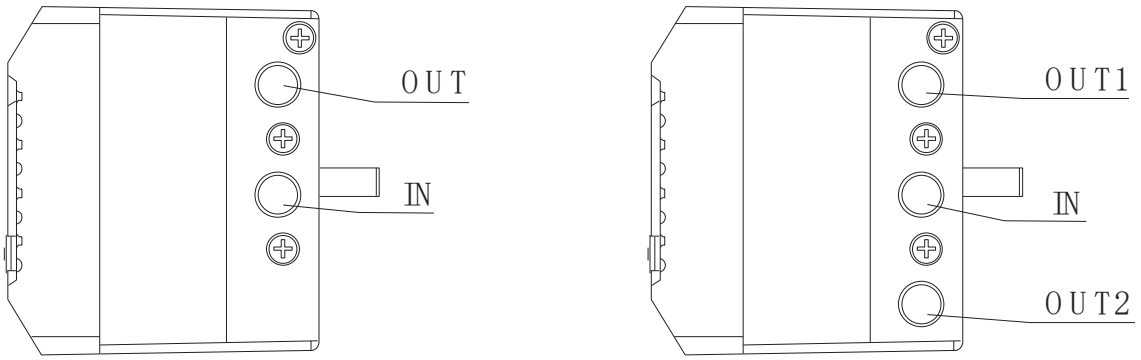


Fig 4-7Pneumatic Connection

Installation Steps:

Connect the output of the A236 smart positioner to the input of the actuator according to Fig. 4-7.

WARNING

Junction leakage is strictly prohibited. Use soapy water to inspect air tightness of connection interfaces.

Connect the IN port of the A236 smart positioner to the air source. The compressed air must be filtered

and regulated by the pressure release valve.

Air requirements:

1. Air pressure must be 0.14 ~ 0.7MPa, depending on the actuator.
2. Air supply should be clean dry air without visible oil steam, oil or other liquids.
3. Air supply should be no significant corrosion air, steam and solvents.
4. Size and density of particulates is Class 4,Oil concentration is Class 4.
5. The air dew point under work pressure should be at least 10 K lower than positioner working environment temperature.

4.4 Electrical connection

4.4.1 Basic requirements

The electrical connections should be strictly in accordance with the connection diagram, and firmly fixed, and not be loose.

The intrinsically safe positioner must be combined with the associated equipment/intrinsic equipment that has passed the explosion-proof certification to form an intrinsically safe explosion-proof system for use in an explosive atmosphere. The wiring of the system must comply with the requirements of the positioner and the associated equipment/intrinsically safe equipment, and the terminals must not be connected incorrectly.

The standard cable connector of this product is a standard waterproof connector. The outer diameter of the signal cable needs to be ⩾8mm and the connector cover should be locked when installing to avoid the IP protection level of this product. If the user introduces the cable introduction device, it must be used locally. A cable entry device or a blocking device approved by a state-authorized inspection agency that meets the requirements of national standards and has a casing protection rating not less than IP20 can be used in explosive hazardous locations.

Any gas that can corrode the flameproof enclosure is prohibited around the positioner.

Operator in installing、 commissioning and maintaining, should comply with the manual and the followings:

IEC 61241-11:2005, Electrical apparatus for use in the presence of combustible dust - Part 11: Protection by intrinsic safety 'iD'

IEC 60079-19:2019 Explosive atmospheres - Part 19: Equipment repair, overhaul and reclamation

IEC 60079-14:2013 Explosive atmospheres - Part 14: Electrical installations design, selection and erection

IEC 60079-17:2013 Explosive atmospheres - Part 17: Electrical installations inspection and maintenance

IEC 60529-2013 Degrees of protection provided by enclosures (IP Code)

4.4.2 Connectionin Intrinsically safe version

4.4.2.1 Input electrical connection(Fig. 4-8)

Type: Loop Power Supply system Input signal: 4~20mA

The min working current: 3.8mAD.C

Input impedance: 455Ω @20mA (Without HART)575Ω @20mA (With HART)

Barrier requirement :

Uo≤28V DC

Io≤93mA

Po≤0.65W

Intrinsically safe parameter (1+ ~2-):

U_i =28V DC C_i=18n F

I_i=93mA $L_i \approx 0$

P_i=0.65W

Non-hazardous AreaHazardous Area zone 0,1 or 2

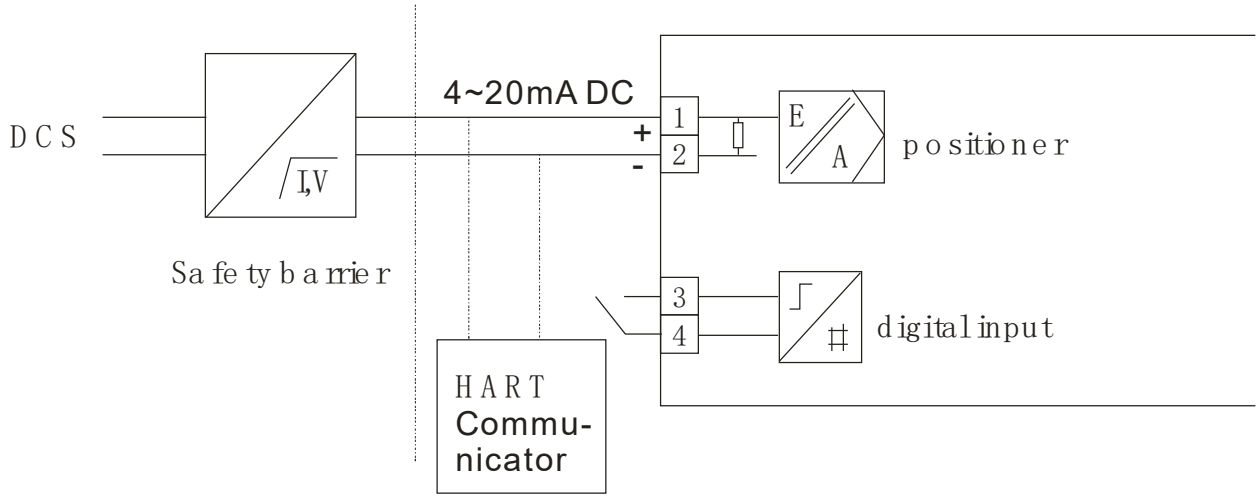


Fig 4-8Input electrical connection

4.4.2.2 Digital output module electrical connection (Fig.4-9)

Working Voltage: <15.5V DC

Output signal:

Digital feedback module	Output current
Signal status "high"	≥2.1 mA
Signal status "low"	≤1.2 mA

Intrinsically safe parameter (21+ ~22-),(31+ ~32-):

Ui=15.5V DC Ci≈0

Ii=25mA Li≈0

Pi=96.9mW

Barrier requirement :

Uo≤15.5V DC

Io≤25mA

Po≤96.9mW

Hazardous Area zone 0,1 or 2Non-hazardous Area

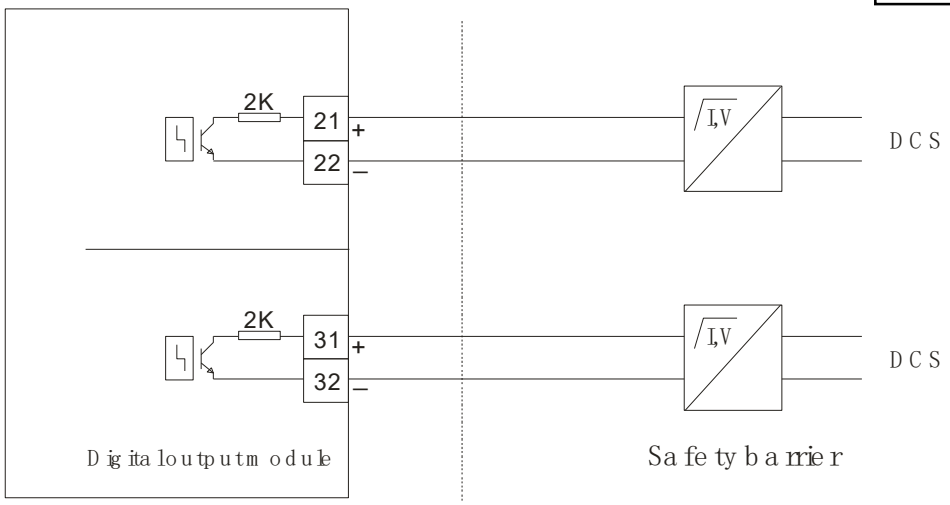


Fig.4-9 Digital output module electrical connection

4.4.2.3 Analog feedback module electrical connection (Fig.4-10)

Feedback signal type: Two-wire system,4~20mA DC

Temperature influence：≤100ppm/℃

Working range： 3.6 ~ 20.5 mA DC

Precision：≤0.1%

Working voltage:12 ～ 28VDC

Intrinsically safe parameter (11+ ~12-):		Barrier requirement :
Ui =28V DC	Ci=10nF	Uo≤28V DC
Ii=93mA	Li≈0	Io≤93mA
Pi=0.65W		Po≤0.65W

Hazardous Area zone 0,1 or 2Non-hazardous Area

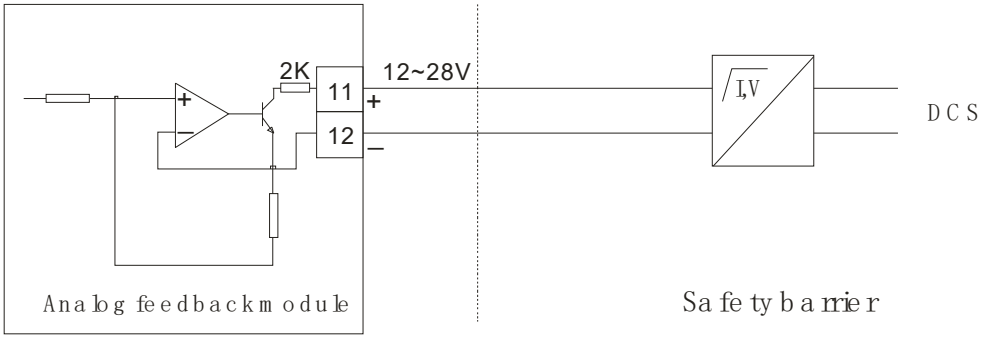


Fig.4-10 Analog feedback output module electronic connection

4.4.3 Connection in Non-intrinsically safe version

4.4.3.1 Input electrical connection (Fig. 4-11)

Type: Loop Power Supply system Input signal: 4~20mA

The min working current: 3.8mAD.C

Input impedance: 455Ω @20mA (Without HART) 575Ω @20mA (With HART)

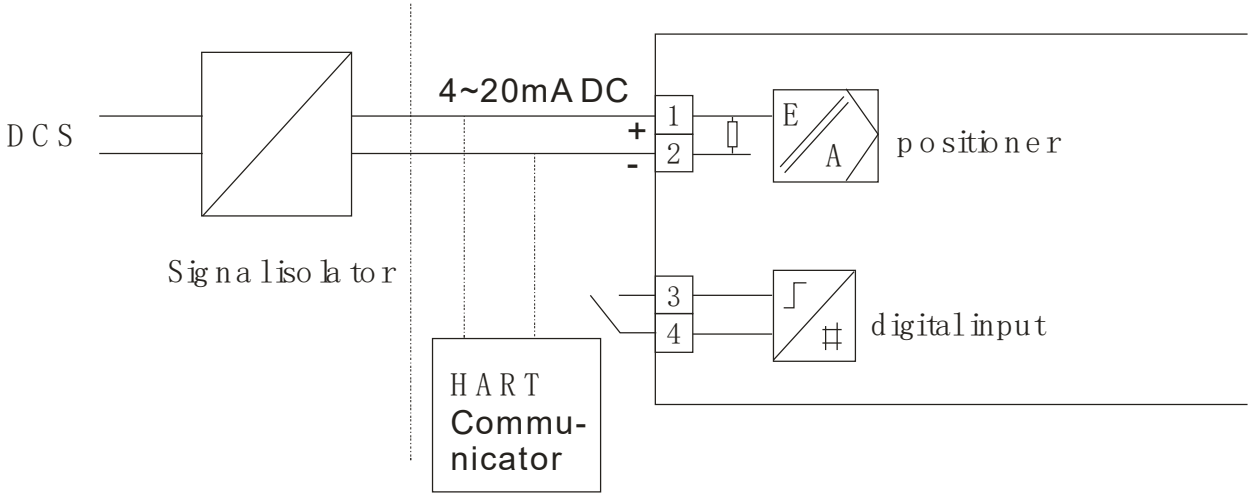


Fig 4-11Input electrical connection..

4.4.3.2 Digital output module electrical connection (Fig.4-12)

Working Voltage: 12~35V DC

Output signal:

Digital feedback module	Output current
Signal status "high"	≥2.1 mA
Signal status "low"	≤1.2 mA

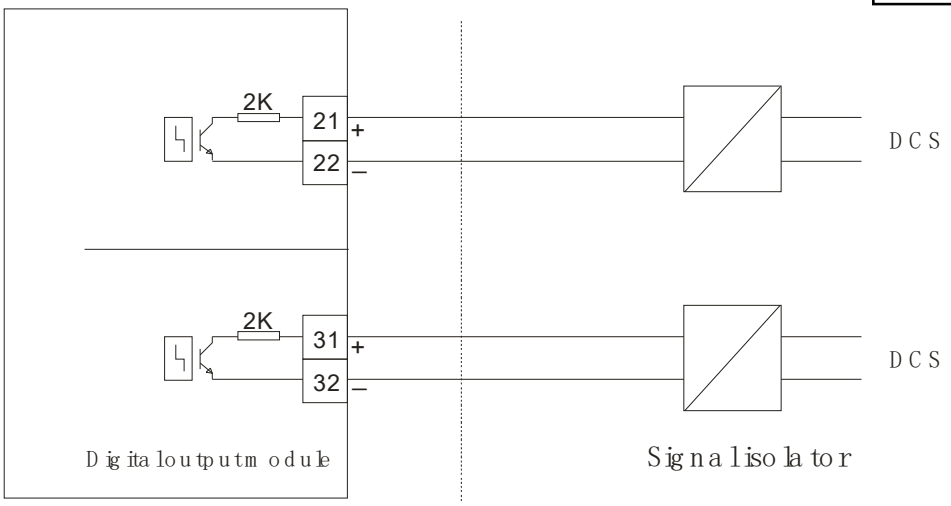


Fig.4-12Digital output module electrical connection

4.4.3.3 Analog feedback module electrical connection (Fig.4-13)

Feedback signal type: Two-wire system,4~20mA DC

Temperature influence：≤100ppm/℃

Working range： 3.6 ~ 20.5 mA DC

Precision：≤0.1%

Working voltage:12 ～ 30VDC

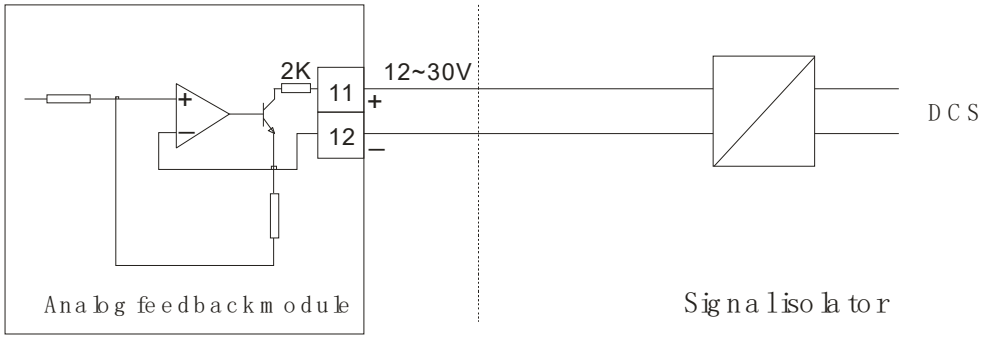


Fig.4-13 Analog feedback output module electronic connection

5 Operation

5.1 Interface description

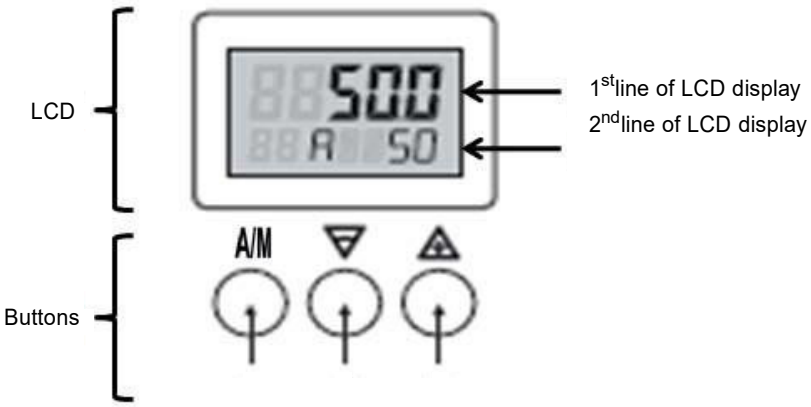


Fig. 5-1.Operation Interface

5.1.1 Display

The LCD display has two lines.

- In the normal mode:
  - The 1st line shows the position.
  - The 2nd line from left to right shows "direction of the valve-action", "the state of running", and "the setpoint".
- In the Configuration menu state:
  - The 1st line shows the parameter value.
  - The 2nd line from left to right shows "parameter number" and "the parameter name".

NOTE

If the positioner is operated in ranges with temperatures below -10°C the LCD display becomes sluggish and the display refresh rate is reduced obviously.

5.1.2 Buttons

The positioner has three buttons. Please refer to Fig.5-1:

- Operation mode switch---A/M
- Decrease----------▼
- Increase----------▲

In the normal mode. Press button A/M, sub mode switch between auto control mode, manual control mode, Position sensor angle check mode.

In manual control mode

- Hold down▲, valve position increase; at the same time hold down▼, valve position increase fast.
- Hold down▼, valve position decrease; at the same time hold down▲, valve position decrease fast.

NOTE

1. Auto control mode: The 2nd line of LCD show "A"
2. Manual control mode: The 2nd line of LCD show "M"
3. Position sensor angle check mode: The 2nd line of LCD show " SENS "

5.2 Configuration mode

5.2.1 Entering configuration mode

In the normal mode, press the button A/M for at least 3 seconds to go into Configuration mode.

5.2.2 Choosing a parameter for configuration

Parametersaregroupedto4differentgroups:P1,P2,P3andP4.

- P1 menu to configure basic parameters, including initialization, show unit, type of actuator, running scope, dead band and etc.
- P2 menu to configure input settings, including direction, split-control, ramp settings, output settings.
- P3 menu to configure valve relative parameters, including running limit control, running directions.
- P4 menu to configure function module, including safety valve settings, switch function input/output settings, current output settings and etc.

In Configuration mode, the user chooses parameter group from P1, P2, P3 or P4.

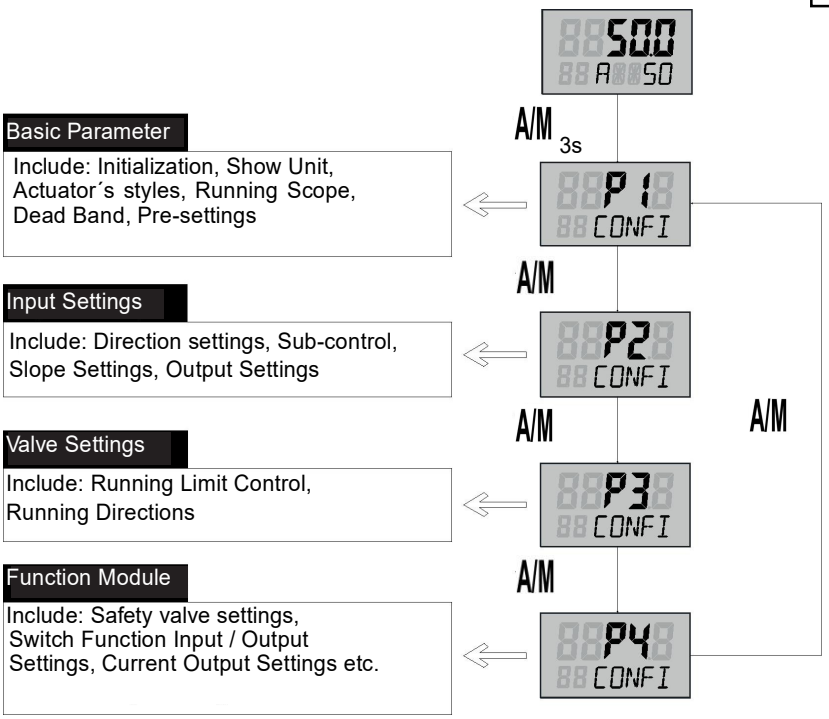


Fig.5-2 Choosing a parameter group

Within this parameter group, the user can choose the parameter:

- Press▲ , the menu turns forward circularly
- Press▼ , the menu turns forward circularly

Here display the contents of parameters: 

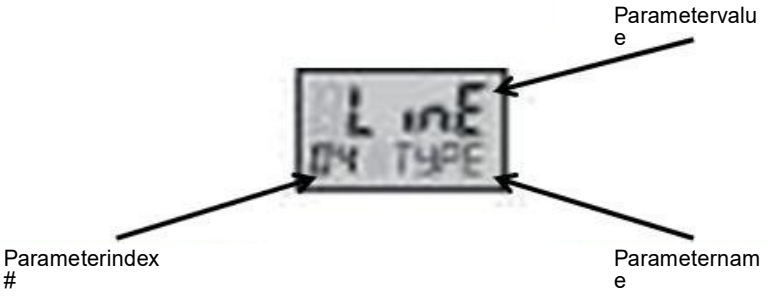


Fig.5-3 Configuring a parameter

Two digits in the front of the 2nd line show the parameter index number, letters in the back display the name of parameter.

5.2.3 Changing a parameter

Press the button A/M to enter the parameter configure mode, the parameters on the screen will be blinking; such as 

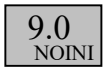
- For numerical parameters:
  - ➢ Press ▲ parameter value will increase. Press the button for longer time, the parameter value increases quickly.
  - ➢ Press▼, parameter value will decrease. Press the button for longer time, the

parameter value decrease quickly.

- For character parameters:
  - Press▲， parameter value move forward.
  - Press▼， parameter value move reverse.

5.2.4 Reset user parameters

- Choosing the PRST parameter:
- Press the button A/M to enter the parameter configure mode, the parameters on the screen will be blinking.
- Press▲, LCD shows "STRT" on the 1st line, after 3 seconds, user parameters are reset and exit configure mode.



5.2.5 Exiting configure mode

Press the button A/M, for 3 seconds to exit the configure mode and return to normal mode.

NOTE

1、The parameter is modified, you must press button A/Mto exit the configure mode and the parameters will be saved.

2、The configure mode, if there is no operation in 1 minutes, the positioner will return to normal state.

5.3Initialization

When the installation is completed, it must be initialized.

There are two ways to initialize: automatic tuning and manual tuning.

5.3.1Check before initialization

Feedback lever's working angle must ensure correct(refer to chapter 4.2.1).

Check that the pipeline connecting the positioner and actuator is correct.

Connect the air supply, the air supply pressure should meet the on-site operating conditions.

Confirming on-site conditions that allow operation of positioner to perform tuning action.

Into the position sensor angle check mode, the 1st shows the feedback lever angle, press▲ or▼ to control the valve movement, when the valve is opened to half, the displayed angle

value is about 0 degrees.

Press▲ or▼ to control the valve to reach the fully open and fully closed position of the value, the positioner should not have an UP or DOWN alarm. The feedback lever should not interfere with other objects.

WARNING

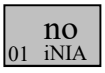
During tuning, the valve will be fully open and fully closed. Check on-site conditions and take measures to ensure that valve movement does not affect personal safety and production process safety.

Before performing tuning, the valve must be manually controlled from the fully open position to the fully close position to ensure that the installation is correct and the feedback lever does not interfere.

5.3.2 Auto tuning

1. In normal mode press and hold A/M more than 3 seconds to enter the configuration mode.

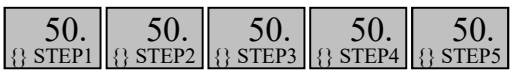
2. Press▲, up shows "N0", down shows “INIA”



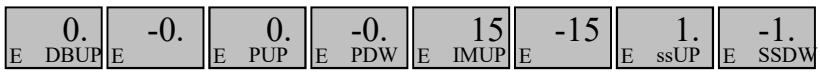
3. Press function key A/M, the down showing will be blinking, enter the parameter configure state.

4. Press ▲ for more than 3 seconds, up shows "STRT", enter the auto-tuning.

5. Thewholeproceduregoesfrom"STEP1"to"STEP5",andshowsthecurrentstepsont hedownline.



6. After tuning, up show the values of parameters, the down shows the "ED XXXX", XXXX means the relevant parameters of tuning.



7. Press button A/M to return to normal mode.

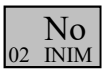
NOTE

During the tuning process, press A/M to exit tuning state and enter normal mode.

5.3.3 Manual tuning

1. Positioner is in normal state after power-up. Press and hold A/M for more than 3 seconds to enter the configuration mode.

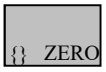
2. Press ▲ to choose the parameter, till the second row shows “INIM”



3. Press the button A/M, the down line will be blinking , enter the parameter amending state.

4. Press ▲for more than 3 seconds, up shows "STRT", then it enter the manual tuning. Down shows “ZERO”

5. Press ▲ or ▼to choose the start point.

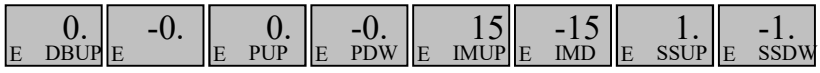


6. Press A/M to confirm, At this time the down line shows “SPRN”

7. Press ▲ or ▼ to choose the end point

8. Press A/M to continue the procedure. The whole procedure is according to the "STEP1" to "STEP5", and shows the current steps on the down line.

9. After tuning, up shows parameters value; the down shows the "ED XXXX", XXXX means the relevant tuned parameters.



10. Press button A/M to return the normal state.

NOTE

During the tuning process, press A/M to exit tuning state and enter normal mode.

5.4 Diagnosis mode

5.4.1 Entering diagnosis mode

In normal mode, press the buttonA/Mand ▲3 seconds to enter the diagnosis mode. Up linedisplaysthevalueofparameter;lowlinedisplaysthenameoftheparameter.

- Press ▲, the parameter moves forward circularly.
- Press ▼, the parameter moves revise circularly.

5.4.2 Exiting the diagnosis mode

In the state of diagnosis: Press the button A/Mfor 3 seconds to exit the diagnosis mode and return to normal mode.

5.4.3 The diagnostic parameter

Parameter		Display	Function	Displayable values	Unit
01	CURR	#CURR	Input current	4.00~20.00	mA
02	TUP	#TUP#	Travel time up	0~200	S
03	TDW	#TDW#	Travel time down	0~200	S
04	DBUP	#DBUP	Dead band up	0.1~10.0	%
05	DBDW	#DBDW	Dead band down	-0.1~-10.0	%
06	PUP	#PUP#	Prediction up	1~100	%
07	PDW	#PDW#	Prediction down	1~100	%
08	IMUP	#IMUP	Impulse length up	2~200	ms
09	IMDW	#IMDW	Impulse length down	2~200	ms
10	SSUP	#SSUP	Short step zone up	0.1~100.0	%
11	SSDW	#SSDW	Short step zone down	0.1~100.0	%

5.5 Alarm

5.5.1 Zero point of position sensor too low

In the sensor angle check mode, if the feedback position value is less than -52.0, the LCD will display "DOWN":

Solution:

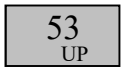
Check whether installation of feedback components is accordance with Chap. 4.2.2 Installed on alinearactuatororChap.4.2.3Installedonarotaryactuatorinthismanual.

Fine-tune the installation bracket position

5.5.2 Span point of position sensor too high

In the sensor angle check mode, if the feedback position value is greater than 52.0.

Display:



Solution:

Check whether installation of feedback components is accordance with Chap.4.2.2Installed on alinearactuatororChap.4.2.3Installedonarotaryactuatorinthismanual.

Fine-tune the installation bracket position

5.5.3 Initialization error

When the positioner tuning, the step 1 is error.

Display:

Solution:

Check the air supply pressure

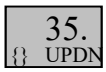
In manual control mode, check whether the valve can be moved up and down

Check if the pneumatic output have gas

5.5.4 Measurement span is insufficient

When the positioner Initialization, the feedback range is less than20.0.

Display:



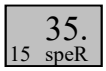
Solution:

Adjust the slider on the control rod components, making the feedback value range greater than 20.0

5.5.5 User characteristics setting error

When the user defines the characteristics profile of the valve, the characteristics is non-monotonic up/down.

Display:



Solution:

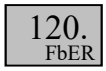
Re-set the parameters

Check the connection of the positioner and the valve

5.5.6 Feedback over limits

Feedback value is> 110% or<-10%

Display:



Solution:

Check feedback sensor, and if necessary, replace the sensor

Re-initialize the positioner

5.5.7 Input current out of work range

If the input current value is greater than21.6mA (>110%) or less than 3.8 mA (<-10%).

Display:

Solution:

Check the input signal

5.5.8 Actuator error

For some reason, the positioner cannot drive the valve to a specific position.

Display:

Solution:

Cleaning valve

Check the valve connected institutions

6 User Parameter

6.1 Parameter list

Item	Parameter	Display	Function	Content/Scope	Default	Unit
P1						
01	INIA	#INIA	Automatic initialization: Not start Start	 NO STRT	NO	
02	INIM	#INIM	Manual initialization: Not start Start	 NO STRT	NO	
03	reserve					
04	TYPE	#TYPE	Type of actuator: Linear actuator /Rotary actuator	 LINE TURN	TURN	
05	reserve					
06	DEBA	#DEBA	Dead band of the controller	Auto 0.1 ~10.0	AUTO	%
07	DEBA1	DEBA1	Dead band of the controller 1	Auto 0.1 ~10.0	AUTO	%
08	PRST	#PRST	Preset(factory setting) Nothing activated Start of factory setting after pressing key for 5s	 NO STRT	NO	
P2						
09	SDIR	#SDIR	Setpoint direction Rising Falling	 RISE FALL	RISE	
10	SPRA	#SPRA	Split range start	0.0~100.0	0.0	%
11	SPRE	#SPRE	Split range end	0.0~100.0	100.0	%
12	TSUP	#TSUP	Setpoint ramp up	AUTO 0~400	0	s
13	TSDO	#TSDO	Setpoint ramp down	AUTO 0~400	0	s
14	SFCT	#SFCT	Setpoint function Valve characteristics linear Equal percentage Inverse equal percentage 21 points freely adjustable 3 points freely adjustable	 LINE 1:30 30:1 FrEE 3-POT	LINE	
15 ~ 35	SP00 ~ SP20	#SP00 ~ #SP20	Setpoint turning points	0.0~100.0		%
P3						
36	YA	##YA#	Start of manipulated variable limiting	0.0~100.0	0.0	%

37	YE	##Ye#	End of manipulated variable limiting	0.0 ~100.0	100.0	%
38	YDIR	#YDIR	Direction of manipulated variable for display Rising Falling	 RISE FALL	RISE	
39	YCDW	#YCDW	Value for tight closing, bottom	OFF 0.0~ 49.9	0.5	%
40	YCUP	#YCUP	Value for tight closing, top	OFF 50.1~ 100.0	99.5	%
41	YNRM	#YNRM	standardization of manipulated variable To mechanical travel To flow	 MPOS FLOW	MPOS	
P4						
42	SAFE	#SAFE	safe position: OFF Freeze Close Settings Open	 OFF KEEP CLOSE 0.1~99.9 OPEN	OFF	%
43	BIN	#BIN#	Digit Input functions: enable “safe position” function	ON OFF	OFF	
44	DO1	#DO1#	Digit output function: Fault alarm Fault + Non-auto Fault + Non-auto+BIN Less than setting value Greater than the setting value	 FAULT FNA FNAB LSET HSET	FAULT	
45	SW1	#SW1#	setting value	0.0 ~ 100.0	0.0	%
46	DO2	#DO2#	Digit output function: Auto/Manual Less than setting value Greater than setting value	 A/M LSET HSET	A/M	
47	SW2	#SW2#	Setting value	0.0 ~ 100.0	0.0	%
48	AMIN	#AMIN	Min output current	4.0 ~ 20.0	4.0	mA
49	AMAX	#AMAX	Max output current	4.0 ~ 20.0	20.0	mA
50	ADIR	#ADIR	Current output direction	RISE FALL	RISE	
51	PROT	#PROT	Write protect for HART	ON OFF	OFF	

6.2 Parameters

1) **INIA** Automatic initialization (Chap.5.3.2 Choosing a parameter for configuration)

   By selecting “Strt” and pressing the button ▲ for at least 5 seconds, automatic initialization is started. The initialization process is displayed by “RUN 1” to “RUN 5”.

2) **INIM Manual initialization (Chap.5.3.3 Changing a parameter)**

   By selecting “Strt” and pressing the button ▲ for at least 5 seconds, manual initialization is started.

3) **Reserve**

4) **TYPE** Type of actuator.

   The actuator is a linear actuator (LINE) or rotary actuator (TURN).

5) **Reserve**

6) **DEBA** Dead band of the controller

   At DEBA = AUTO the dead zone in automatic operation is adapted continuously to the requirements of the control circuit. The dead zone is gradually increased on detecting a control oscillation. The reverse adaptation takes place by a time criterion.

   In the other discrete settings the fixed value is used for the dead zone.

7) **DEBA1** Dead band of the controller 1

   When DEBA1 = AUTO, the DEBA1is equal to the DEBA value, which will change according to the operating conditions during the running process. When the valve position changes cause oscillation (such as pipeline leakage), the appropriate increase of the DEBA1 can be alleviated. oscillation.

   When DEBA1 has other values, the controller dead zone 1 is a fixed value set.

8) **PRST** Preset

   Establishing the factory setting and resetting the initialization.

NOTE

The positioner must be re-initialized after Preset. All previously determined maintenance parameters are cleared.

9) SDIR Setpoint direction (see Fig.6-1)

The setting of the setpoint direction serves to reverse the direction of action of the setpoint. It is used mainly for the split range mode and in single--acting actuators with the safety position “up”.

10) SPRA Split range start (see Fig.6-1)

11) SPRE Split range end (see Fig.6-1)

In Menu P2, the parameters "10.SPRA" and "11.SPRE" and "9.SDIR" restrict the active setpoint range. In this way, split range tasks can be done by the following characteristics.

- rising /falling
- falling /rising
- falling /falling
- rising /rising

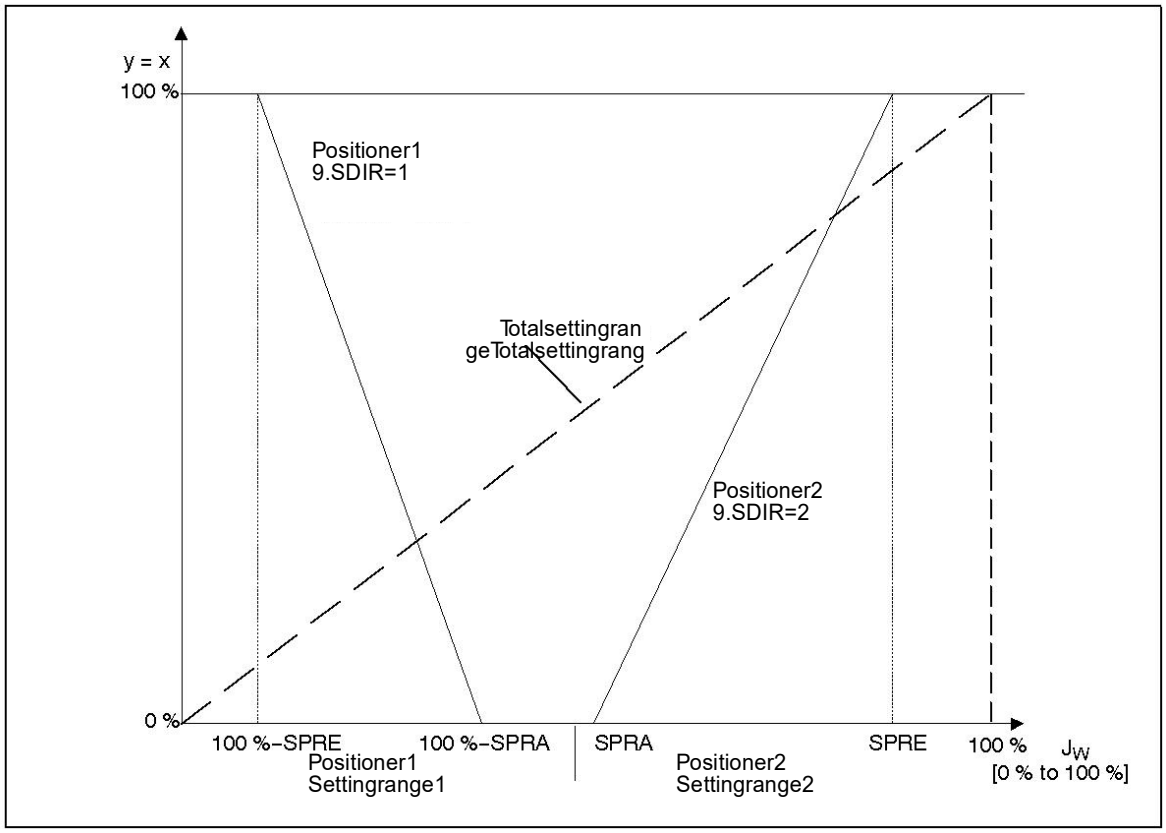


Fig.6-1 Split range-operation with two positioners

12) TSUP Setpoint ramp UP

And

13) TSDO Setpoint ramp DOWN

The setpoint ramp is effective in automatic operation and limits the speed of alteration of the active setpoint. When switching over from manual operation to automatic the active setpoint is adjusted to the setpoint on the positioner with the setpoint ramp.

This bumpless manual/automatic switchover avoids excessive pressure increases on long pipelines.

In the position TSUP = Auto the slower of the two travel times determined during initialization is used for the setpoint ramp. TSDO is then ineffective.

14) SFCT Setpoint function

Non--linear valve characteristics can be linearized with this function and any flow characteristics simulated in linear valve characteristics.

Four valve characteristics are stored in the positioner

- Linear (14.SFCT = LINE, factory setting)
- equal percentage 1:30(14.SFCT=1:30)
- inverse equal percentage 30:1(14.SFCT=30:1)
- freely adjustable (14.SFCT=FREE)

15) SP00 to 35) SP20 Setpoint turning points

A flow parameter can be assigned to the respective setpoint turning value at an interval of 5 %. These points lead to a polygon chain with 20 straight lines which therefore represents a projection of the valve characteristic.

The setpoint vertex values can only be input at 14.SFCT=FrEE. You may only enter a strictly monotonous characteristic, and two consecutive vertex values must differ by at least 0.2 %.

36) YA Manipulated variable limiting start

And

37) YE Manipulated variable limiting end

38) YDIR Zero position

With this parameter you can assign the zero position of the display to the zero position of the valves and fittings. It also allows you to select the direction of rotation of the sensor shaft (looking at the open housing).

39) YCDW Value for tight closing, bottom

And

40) YCUP Value for tight closing, top

With this function the valve can be driven to the seat with the maximum actuating force of the actuator (continuous contact of the piezo-valves).

The tight closing function can be activated on one side or for both limit positions.

The tight closing function can be activated when the setpoint is below the value set with parameter “YCDO” or above that set with parameter “YCUP”.

41) YNRM Manipulated variable standardization

Using the "YA" and "YE" parameters, you can limit the manipulated variable. This limitation causes two different scaling types, MPOS or FLOW, for the digital display and for the position feedback through the current output. See the figure below.

The MPOS scaling type shows the mechanical position from 0 to 100% between the hard stops of the initialization. The position is not influenced by the "YA" or "YE" parameters. The parameters "YA" and "YE" are shown in the MPOS scale.

The FLOW scale is a scaling from 0 to 100% over the range between the "YA" and "YE" parameters. Over this range, the setpoint w is also always 0 to 100%. This results in a more or less flow-proportional display and position feedback "AO". The flow-proportional display and position feedback" AO " also results from the use of valve characteristics.

In order to calculate the regulation difference, the setpoint in the digital display is also shown to the corresponding scale.

The following uses the example of an 80-mm linear actuator to illustrate the dependence of the stroke on the scaling as well as the parameters "YA" and "YE".

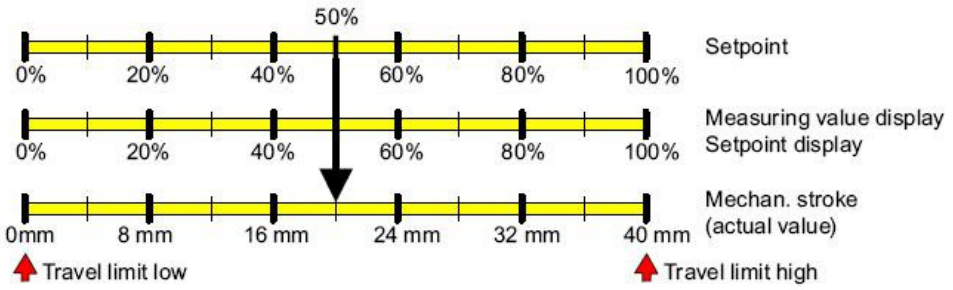


Fig.8-1 YNRM = MPOS or YNRM = FLOW; default: YA = 0 % and YE = 100 %

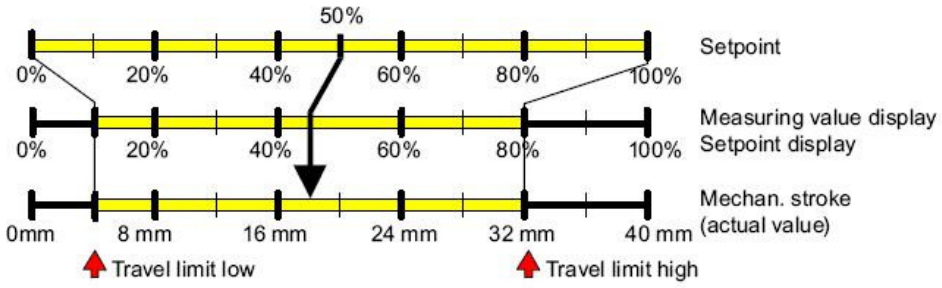


Fig.8-2 Example: YNRM = MPOS with YA = 10 % and YE = 80 %

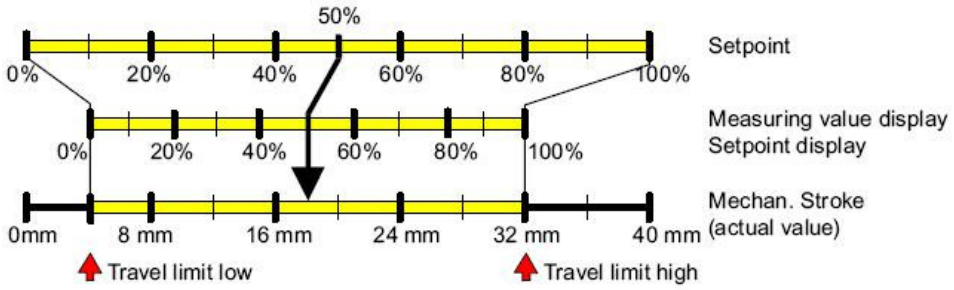


Fig.8-3 Example: YNRM = FLOW with YA = 10 % and YE = 80 %

42) SAFE Safe position

Only when 43.BIN is set to be ON, Safety valve is effective

If binary input is logic 0, valve will be drive to the position specified by this value.

43) BIN Digit Input functions

Enable or disable “safe position” function.

44) DO1 Digit output function 1

When positioner detected set fault, channel 1(DO1) of binary output module state is "high".

45) SW1 DO1 set value

When DO1 = LSET, valve position is less than the SW1, channel 1(DO1) of binary output module state is "high".

When DO1 = HSET, valve position is greater than the SW1, channel 1(DO1) of binary output module state is "high".

46) DO2 Digit output function 2

When positioner detected set fault, channel 2(DO2) of binary output module state is "high"

47) SW2 DO2 set value

When DO2 = LSET, valve position is less than the SW2, channel 2(DO2) of binary output module state is "high".

When DO2 = HSET, valve position is greater than the SW2, channel 2(DO2) of

binary output module state is "high".

48) AMIN Min output current

Min output current for the 0% position.

49) AMAX

Max output current

Max output current for the 100% position.

50) ADIR

Relation between the output current of position feedback module and valve position. There are two choices: rise and fall. When choosing rise, output current will be 4mA when valve position is 0%; output current will be 20mA when valve position is 100%. When choosing fall, the result will be opposite.

51) PROT Write protect for HART

When PROT = ON, write parameter is allowed by PC or field communicator with HART protocol.

When PROT = OFF, write parameter is not allowed by PC or field communicator with HART protocol.

7 Fault and Maintenance

7.1 Trouble shooting

When positioner failed, follow these steps to eliminate fault.If you cannot solve the fault according to steps as bellow, please contact the sales representatives of the factory.

Fault	Reason	Solution
Actuator has no action both in manual and auto state	Air pressure low	Adjust the pressure of air source to actuator pressure.
	Actuator jammed	Solve problem of actuator jammed
Actuator does not move or moves slowly	Air pressure low	Adjust the pressure of air source to actuator pressure.
	Exit initialization before finish	Re-initialize
Move frequently	Leakage in air loop	Check whether the external gas path leaks.
		Increase the value of DEBA1
Oscillation	User configuration incorrect	Set larger dead band, larger setpoint ramp
	Volume of actuator is too small	Set larger dead band, larger setpoint ramp
	Return difference is large	Check the installation of bracket and feedback connection, re-initialize if need
Valve cannot be fully opened or closed	Air pressure low	Adjust the pressure of air source to actuator pressure.
	initialization data incorrect	Re-initialize
	Position limit is set	Check Menu
	Tighten closing not set	Set tighten closing function
No display	Signal too small(<3.6mA)	Check input signal
	Electrical connection terminal screws loose	Tighten the terminal screws
	Main board failed	Change the mainboard
Exhaust not smooth	The exhaust plug	Cleaning the exhaust
No position feedback current	Position feedback module failed	Change the module
	No external power, position feedback module not work	Provide 24V power to the module
	Polarity reversal of external connection	Rewire
Feedback current mismatch actual position	Position feedback module failed	Change the module
	Zero or Span drift	Tune the Zero or Span trimmer of module
Position display on LCD mismatch actual position	Actuator travel range mismatch the scale	Manual initialize

WARNING

Do not change any explosion proof device.

7.2 Maintenance

Positioner is an instrument which should be regularly maintained. The air supply of positioner should be kept dry and clean. Regularly exhaust water and pollution of the regulator connecting the positioner in order to keep the positioner normally.

Feedback connection may be loose due to long term work. Check the feedback connection regularly. If loose, tighten at once and decide whether to initialize or not according to valve zero and span position deviation.

In order to see whether the air pressure is normal, keep the pressure gauge clear.

Inspection and maintenance of explosion proof parts should according to location laws.

8 Transportation and storage

Check whether the signs are complete before storage, and the packing cases are firm. Finally check the reliability and safety of the bandage.

During transportation, light loading and unloading should be carried out, and the impact and pressure dampness and damage of the machine should be strictly prohibited.

Stored in the temperature was minus -40 ~ 80 ℃, relative humidity is not more than 75%, no condensation, corrosion instrument does not contain harmful impurities in the air

Place on the surface of the packing box.

9 Ordering Information

9.1 The detail product models is in the following

Code	A236	X	X	X	X	X	X	X	X	X	X	X	X

Indicator	Without	0
	3D Indicator	1

Control Type	Standard	S
	Remote	R

Fail Status	Fail Reset	R
	Fail Freeze	F

Act. Working Type	Linear	L
	Rotary	R

Actuator Type	Single Act.	S
	Double Act.	D

Approvals	Standard	0
	Ex ia	1
	Ex d	2

Communication	Without	0
	HART	H
	Profibus PA	P
	Foundation Filendbus	F

Position Feedback	Without	0
	4-20 mA Analogue Feedback	1

Limit Monitor	without	0
	Electronik Limit Switch	1

Electric / Pneumatic Connection	M20x1,5 - G1/4"	0
	1/2" NPT - 1/4" NPT	1

Gauge Assembly	Without	0
	SS Pressure Gauge	1

Housing Material	Aluminium	0
	St. Steel	1

9.2 Feedback connection

Feedback connection	Bracket	Name	Travel range	Model
Short+Linear	Standard+Linear	Short+Linear&Standard+Linear	10-35mm	MVP-DBP
Middle+Linear	Standard+Linear	Middle+Linear&Standard+Linear	20-70mm	MVP-ZBP
Long+Linear	Standard+Linear	Long+Linear&Standard+Linear	35-130mm	MVP-CBP
Rotary	Standard+Rotary	Rotary&Standard+Rotary	30-105°	MVP-RBP
1:6+Linear	Standard+Linear	1:6+Linear&Standard+Linear	10-20mm	MVP-XBP
Short+Linear	Standard+Stainless steel+Linear	Short +Linear&Standard+Stainless steel+Linear	10-35mm	MVP-DBS
Middle+Linear	Standard+Stainless steel+Linear	Middle +Linear&Standard+Stainless steel+Linear	20-70mm	MVP-ZBS
Long+Linear	Standard+Stainless steel+Linear	Long +Linear&Standard+Stainless steel+Linear	35-130mm	MVP-CBS
Rotary	Standard+Stainless +Rotary	Rotary&Standard+Stainless +Rotary	30-105°	MVP-RBS
Short+Linear	Strengthen+Stainlesssteel+ Linear	Short +Linear& Strengthen +Stainless steel+Linear	10-35mm	MVP-DCS
Middle+Linear	Strengthen+Stainlesssteel+ Linear	Middle +Linear& Strengthen +Stainless steel+Linear	20-70mm	MVP-ZCS
Long+Linear	Strengthen+Stainlesssteel+ Linear	Long +Linear& Strengthen +Stainless steel+Linear	35-130mm	MVP-CCS

Factory offer sales support, service, inventory and commissioning to our global customers. Please contact to our Istanbul Sales Office if you are a domestic customer.

FACTORY

KOBI O.S.B.
1. Cad. 32. Sok. No:10
Köseler Köyü 41480
Dilovası/Kocaeli TR
T +90 262 728 1474
F +90 262 728 1477

SALES OFFICE

H. Bagdatlioglu Plaza
S.İlknur Keles Sokak No:7 Kat:1
Kozyatagi Mahallesi
Kadikoy / Istanbul TR
T +90 216 420 0074
F +90 216 420 0094

www.dorukendustri.com

For complete list of our products, please visit
www.dorukendustri.com
or contact us at info@dorukendustri.com

All Rights Reserved.
We reserve the right to modify or improve the designs or specifications of the products mentioned in this manual at any time without notice. Doruk Endüstri - PROVAL does not assume responsibility for the selection, use or maintenance of any product. Responsibility for proper selection, use and maintenance of any PROVAL product remains solely with the purchaser.
©2023 Doruk Endüstri Ltd.