

STI

Smart Valve Positioner

ST-6

Product Manual



Catalogue

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1 Preface

1.1 Read the instructions before use

This manual contains information on the installation, commissioning, maintenance and components of the ST-6 series valve positioner. Please place this manual in a location where each user can easily identify it and provide it to each new user of the equipment.

The installation, commissioning and maintenance of products can only be performed by trained professionals and must be authorized by plant management prior to installation.

To avoid personal injury or damage to valve system components, strictly follow the warnings and precautions marked in this manual. Before installation or commissioning, please read this product manual and fully understand how to use the product correctly.

Operators must strictly comply with the applicable national regulations on the installation, functional testing, maintenance and maintenance of electrical products. If there are problems not mentioned in this manual, please contact us.

This manual may be changed or revised according to software and hardware upgrades without further notice.

Version of the specification	PM-ST-6CN-02/2018
Software release	V.1.0

1.2 Safety Precautions

This instruction manual contains safety precautions to ensure the safety of equipment operators and the equipment itself. For the safety of the equipment and personnel, please strictly adhere to the safety precautions and relevant safety regulations in this manual.

- **Danger:** Failure to comply may result in serious injury or death.
- **Warning:** Failure to comply may lead to system failure or cause minor or serious injuries.
- **Caution:** Failure to comply may cause damage to the product or system, or reduce the product's control performance.

Warning

- Installation and debugging should be carried out by technicians with professional knowledge and qualifications.
- Adhere to the product parameter range. Using beyond the specified parameter range may cause malfunctions.
- Do not install, debug, or perform maintenance until safety is ensured.
- Before disassembling gas pipes or valves, cut off the gas source input and release the residual air pressure in the system.
- Before installation, debugging, or maintenance, cut off the power supply to avoid accidental current input.
- Comply with relevant safety regulations of the factory and electrical equipment.

1.3 Safety matters when used in hazardous areas

In order to prevent the risk of explosion, in addition to complying with the regulations used in the Ex field, the following matters must be observed.



Danger

- The relevant regulations (national security regulations) and general technical guidelines for construction and operation shall be observed.
- It must be confirmed whether the product meets the requirements of the corresponding use area.
- Determine the parameter range and explosion-proof rating range of the locator.
- It is necessary to block unnecessary electrical outlets on the street in accordance with regulations.

1.3.1 Maintain the conditions of intrinsic safety (Ex i) explosion protection



Danger

If the equipment is operated in a non-essential safety circuit or if electrical specifications are not followed, the safety of the equipment in hazardous areas cannot be ensured and there is an explosion hazard.

- Only equipment with "intrinsic safety" protection type can be connected to the intrinsic safety circuit.
- Be sure to comply with the electrical data specifications in the explosion-proof certificate or technical data.

1.3.2 Intrinsic explosion-proof regulations

Intrinsic explosion-proof regulations and laws	IEC 60079-0:2007-10 IEC 60079-11:2006 IEC 61241-11:2005				
Intrinsic explosion-proof rating	Non-explosion-proof				
Safety fence parameters	Ui	Ii	Pi	Ci	Li
Input current signal	28V	100mA	651mW	0.6nF	300uH
Feedback current signal	28V	100mA	651mW	0.6nF	300uH
Limit switch (mechanical)	28V	100mA	651mW	0nF	0uH

Note: Please refer to the explosion-proof certificate for details.

2 Product introduction

2.1 Brief introduction

The intelligent valve positioner ST-6 series receives the 4~20mA DC current signal from the control room or signal generator and other current output devices, adjusts the air pressure input to the valve actuator, and precisely adjusts the valve opening according to the proportion.

2.2 Characteristic

- LCD screen (LCD) and four buttons
- Quick and easy automatic setting
- Partial itinerary test function (PST)
- Fault alarm function
- Built-in automatic/manual switch knob
- self-diagnostic function
- IP66/NEMA4X protection class
- The large flow lead valve is used to speed up the valve action
- Impact resistant, seismic design

2.3 Options function

By adding the option module, you can implement the corresponding function, plug and play.

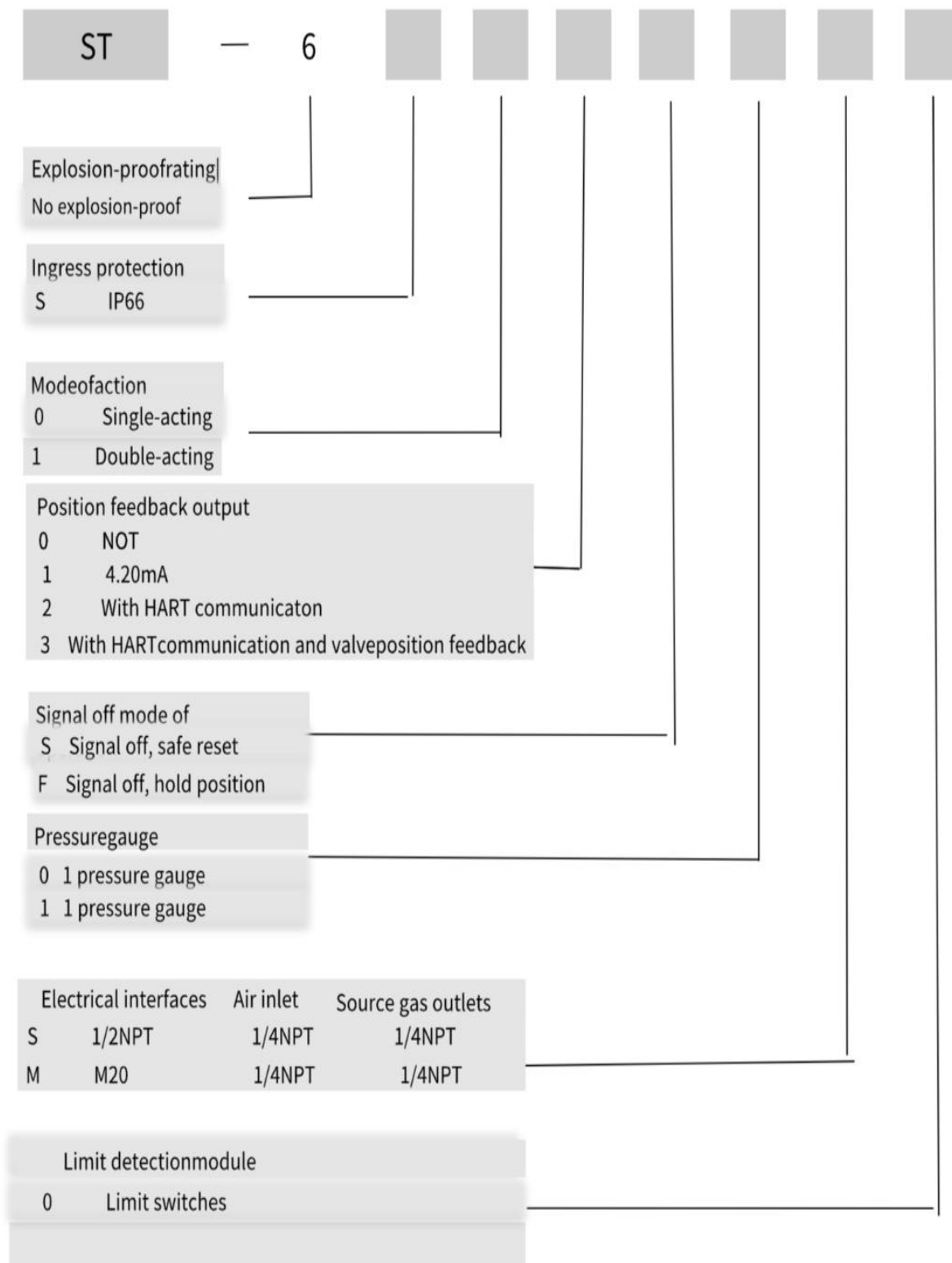
- Valve position feedback signal (4~20mA DC)
- HART Communications (Version: HART 7)
- Alarm switch (2 sets)

2.4 Application area

The ST-6 series is installed on the control valve for industrial fluid control field.

• Petroleum and Natural Gas
• Chemical Industry
• Power Plant
• Papermaking
• Water Treatment
• Pharmaceuticals
• Printing and Dyeing Processing
• Food and Beverage
• Others

2.5 Model marking method



2.6 Product Parameter

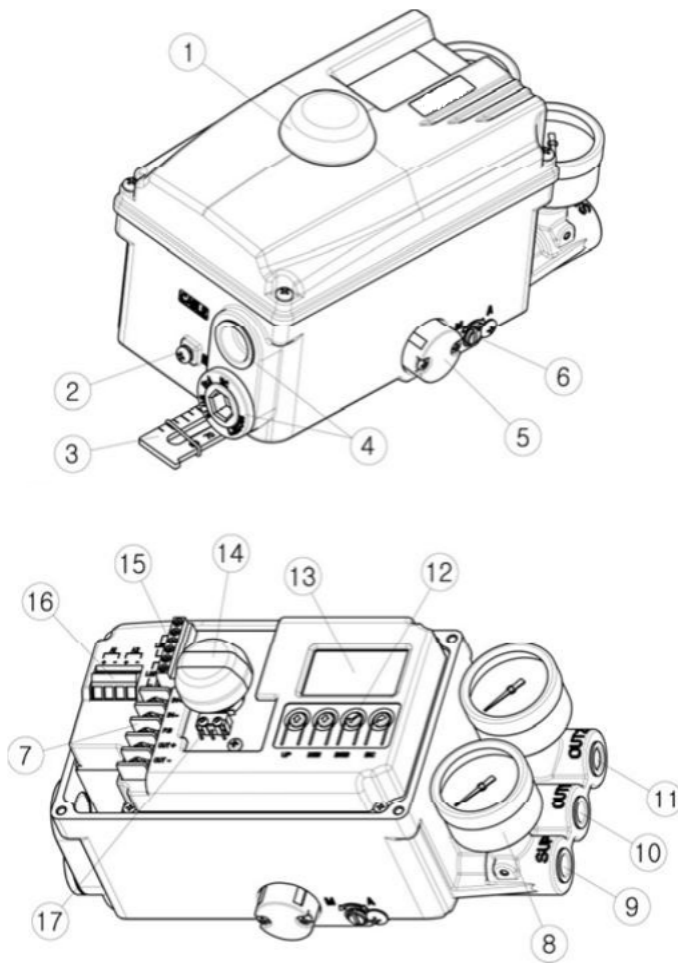
Model		ST-6
Input current range		4~20mA DC
Internal impedance		Lessthan500Ω (20mADC)
Input pressure range		0.14~0.7
Scope of travel		10~150mm(linear stroke),0~900(angular stroke)
Air source interface size		PT1/4,
Pressure gauge interface size		PT1/8,
Electrical interface size		G(PF)1/2, NPT1/2
Anti-hazard classification		Ex i a IIC T5/T6
Enclosure protection level.		IP66
Ambient temperature	Normal operating temperature range	-30°C~85°C(standard type), -40°C~85°C(low temperature type)
	Explosion-proof temperature range	-40°C~80°C(T5) / -40°C~70°C(T6)
Linear		±0.5% F.S.
Sensitivity		±0.2% F.S.
Latency		±0.5% F.S.
Repetitiveness		±0.3% F.S.
Gas consumption		Lessthan2.3LPM(Sup.=0.14MPa)
Rate of flow		Above100LPM(Sup.=0.14MPa)
Material quality		Aluminium diecasting
Weight		2.2kg

Option parameters

Option	Project	Parameter
HART communication	HART edition	HART 7
Valve position feedback	Wiring	Second line connected
	Series voltage range	9~30VDC
Alarm switch module	Series voltage range	9~30V

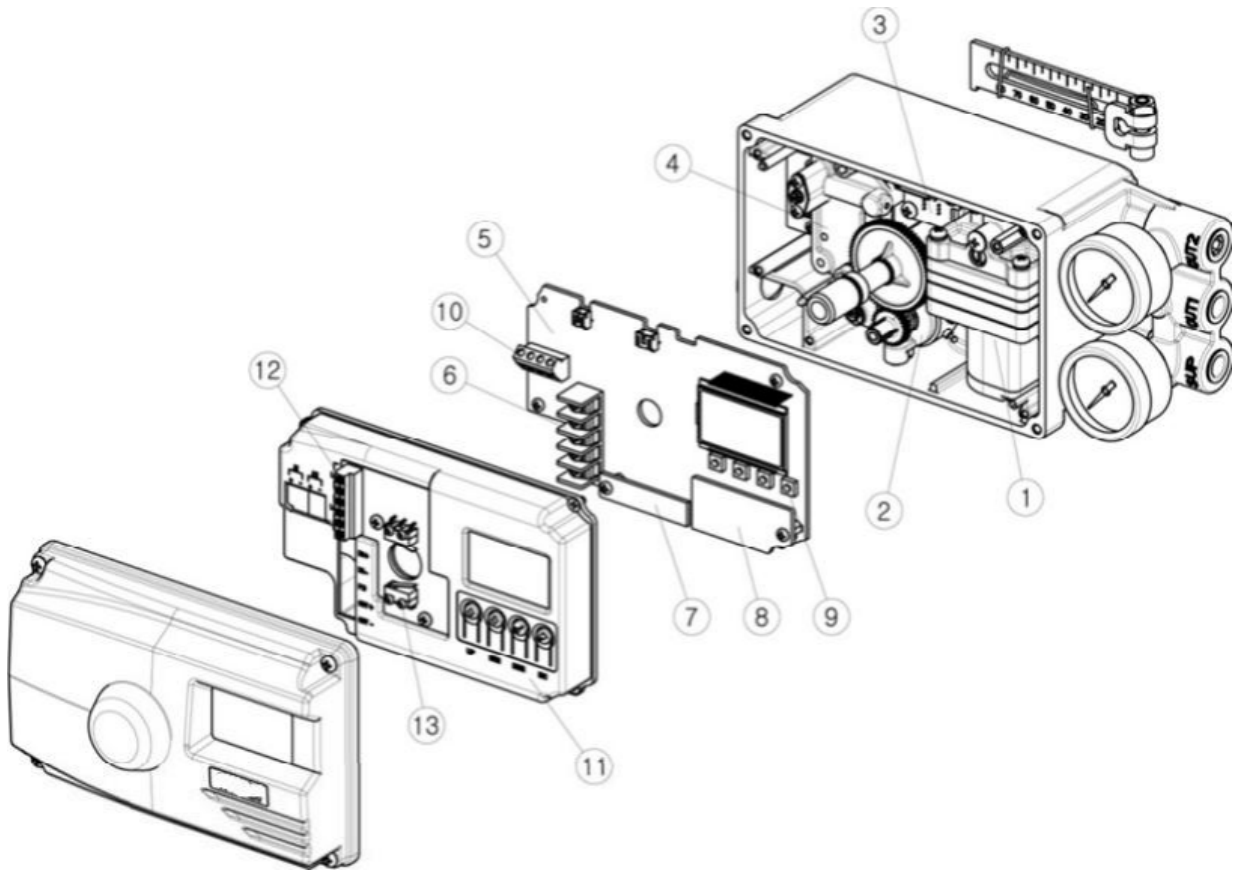
2.7 Structural diagram

2.7.1 Exterior structure diagram



1. Opening indicator window
2. External grounding screw
3. Feedback rod
4. Electrical interfaces (2)
5. Exhaust cap
6. Automatic/manual switch
7. Terminal block
8. Pressure gauge
9. Air source input interface
10. Air source output interface 1
11. Air source output interface 2
12. Buttons (4)
13. Liquid crystal screen
14. Opening indicator
15. Terminal block for limit switch
16. Terminal block for fault alarm
17. Limit switch

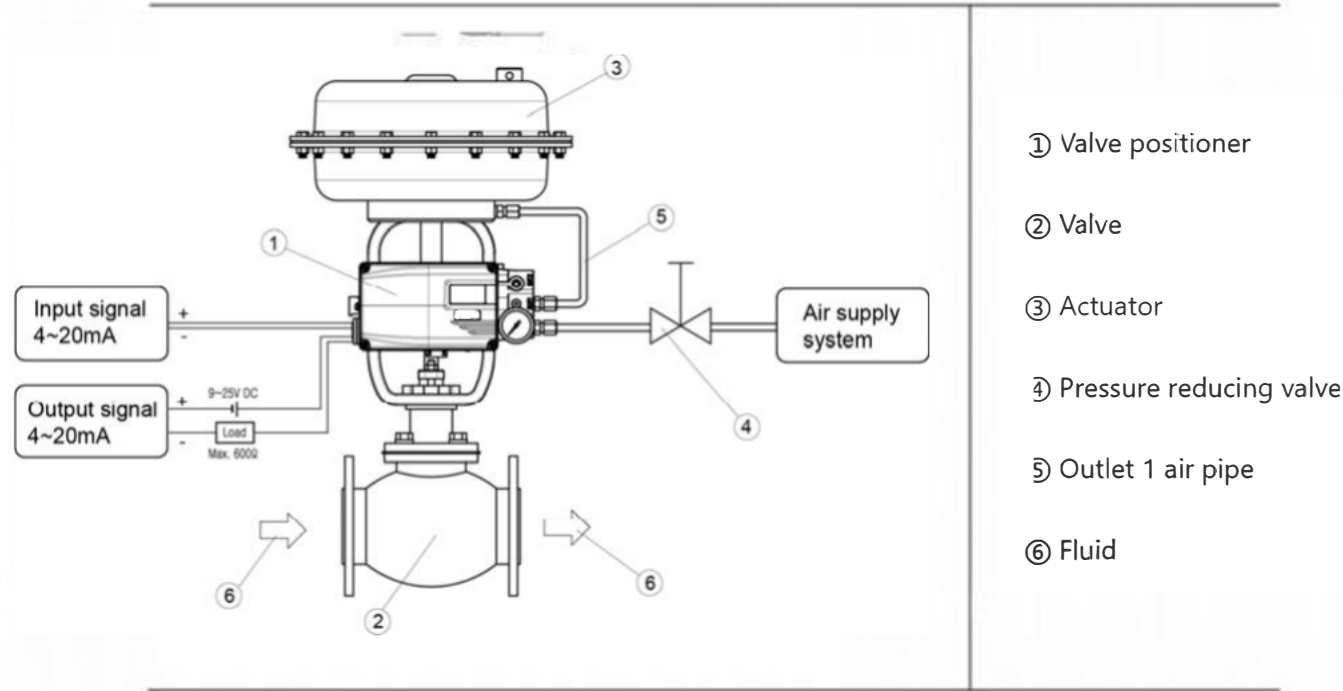
2.7.2 Internal structure diagram



-
- | | |
|---|--|
| 1. Pilot valve | 8. Valve position feedback module (optional) |
| 2. Potentiometer | 9. Button |
| 3. Pressure sensor (optional) | 10. Terminal block for fault alarm |
| 4. Torque motor | 11. Circuit board protective cover |
| 5. Main circuit board | 12. Terminal block for limit switch |
| 6. Terminal block | 13. Limit switch (optional) |
| 7. HART communication module (optional) | |
-

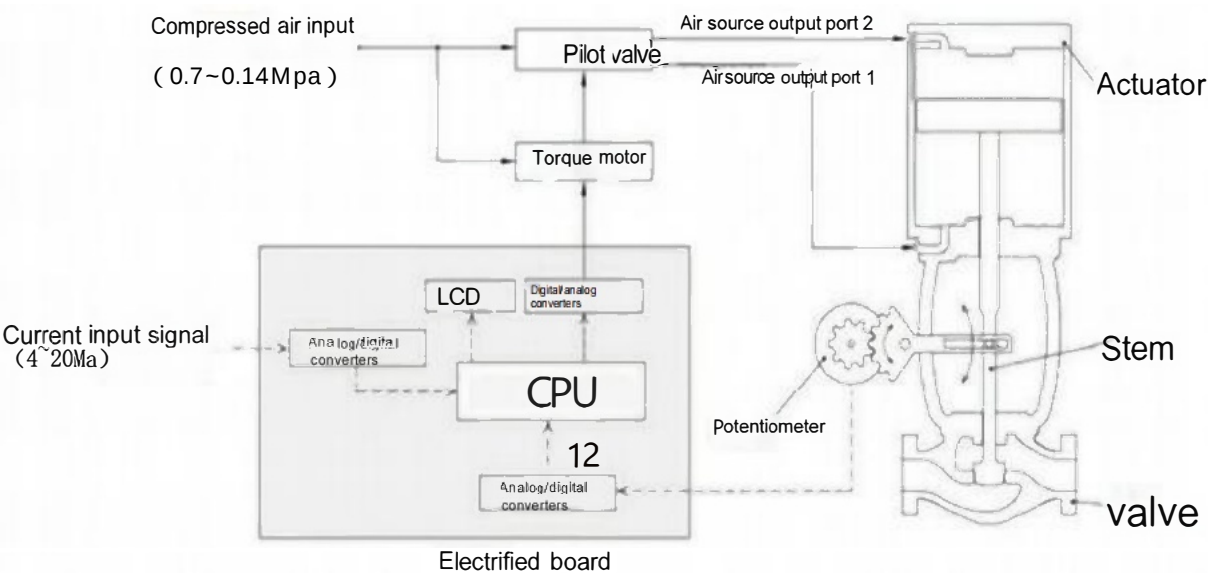
2.9 Schematic diagram of the system installation

In general, the control valve is supplied to the valve by a valve positioner (ST-6) that controls the air pressure of the actuator. It is composed of an actuator that switches power and a valve that controls the flow of fluid.



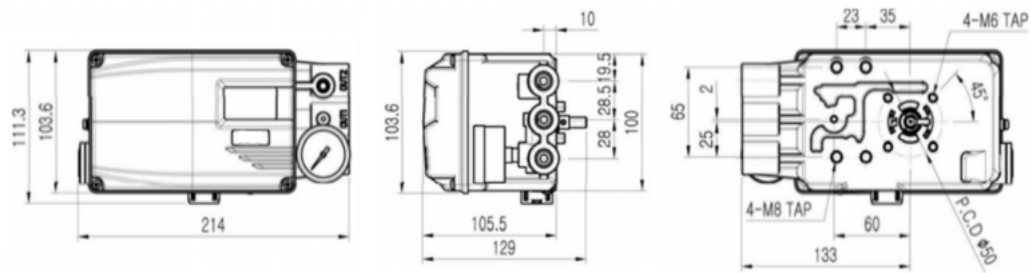
2.10 Principle of action

ST-6 receives the current signal (4~20mA) from the control room, and the displacement change of the valve stem drives the change of the resistance value of the potentiometer. The central processing unit (CPU) compares the above two signals and transmits the control finger to the torque motor (IP converter). The torque motor converts this command into a barometric pressure signal and adjusts the output air pressure of outlet 1 and outlet 2 of the pilot valve to control the opening of the valve.

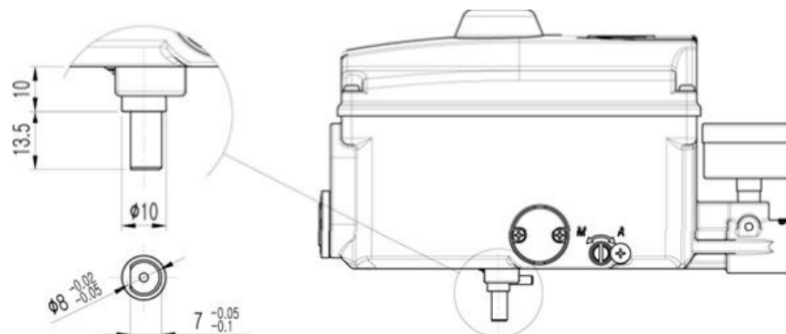


2.11 Outline dimensional drawing

2.11.1 Product external dimensions



2.11.2 Feedback rod connection haft external dimensions



3 Install

3.1 Precautions before installation



Pay attention to

Before installing the product, please confirm whether the valve and actuator meet the site requirements. If the installation status is incorrect, the adjustment performance of the product will be reduced.

3.2 Installation of linear products

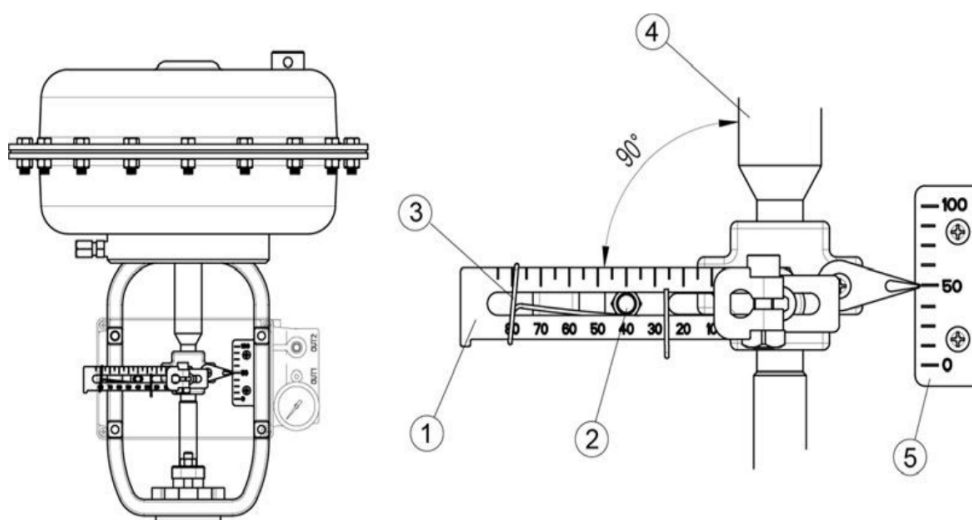
3.2.1 Precautions during installation

When making a bracket or connecting a feedback rod, you must follow the following two precautions. If you do not follow them, the linear accuracy of the product will be affected.



Pay attention to

- ① When the valve is open at 50%, the feedback rod should remain horizontal.
- ② When the valve opening is at 50%, the installation position of the feedback rod connection pin must be located at the valve travel scale.



- | | |
|-------------------------------|---------------------------------|
| ① Feedback rod | ④ The actuator pushes the lever |
| ② Feedback rod connection pin | ⑤ Valve opening indicator |
| ③ Fixed spring | |

3.2.2 The effective rotation angle range of the feedback rod

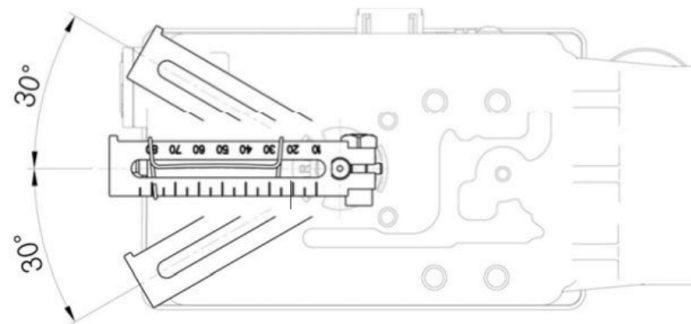
The effective rotation Angle range of the feedback rod for straight stroke products is 30 degrees up and down horizontally (for 60 degrees). By following the precautions described in 3.2.1, the effective rotation Angle can be ensured to give the best performance.



Pay attention to

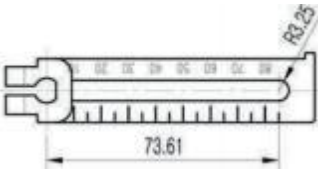
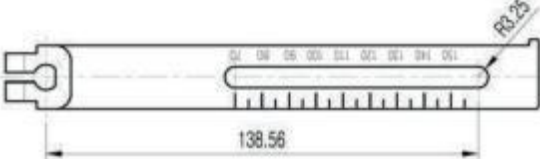
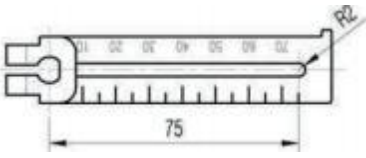
If the effective rotation Angle of the product is too small when moving, the linear accuracy of the product will be reduced.

If the effective rotation Angle of the product is too large when moving, the product may be damaged or cause product failure.



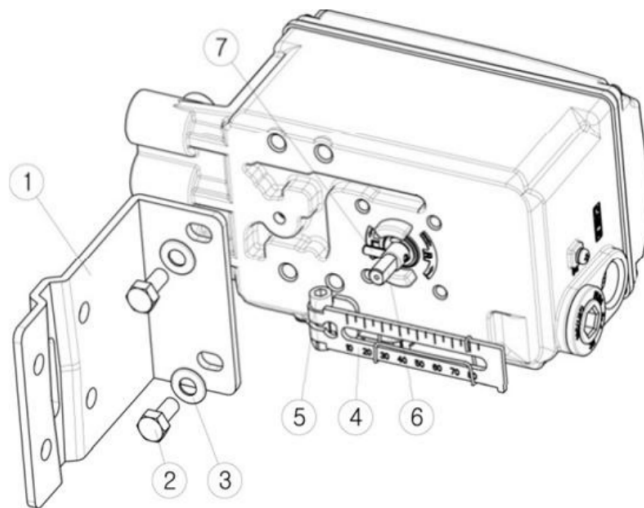
3.2.3 Type and size of feedback rod

The scale number on the feedback rod indicates the travel size of the valve. When connecting the feedback rod to the connecting pin, the corresponding scale must be aligned.

Feedback rod sequence	Valve stroke range	Size dimension
1	10~80mm	
2	70~150mm	
3	10~70mm	

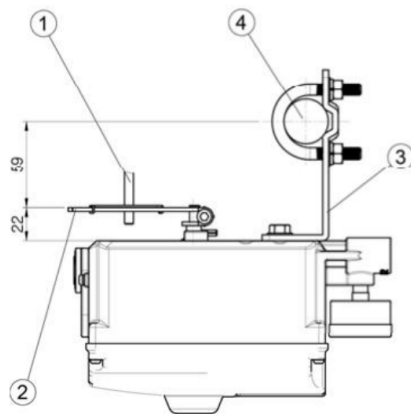
3.2.4 Mountingbracket

Please refer to the product size drawing (page 142.10.2) and the actuator drawing to make the corresponding bracket and install it correctly on the actuator bracket.

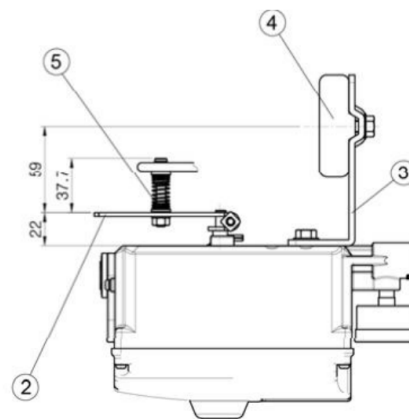


- ① Mounting bracket
- ② Fixed screws (M8)
- ③ Bed down the liv-estock
- ④ Feedback rod
- ⑤ Fix the feedbackrod screw
- ⑥ Principal axis
- ⑦ Spindle limit pin

3.2.5 Size drawing when installed on actuator



<Feedback rods 1 and 2>



<3 feedback rod>

① Feedback rod link pin

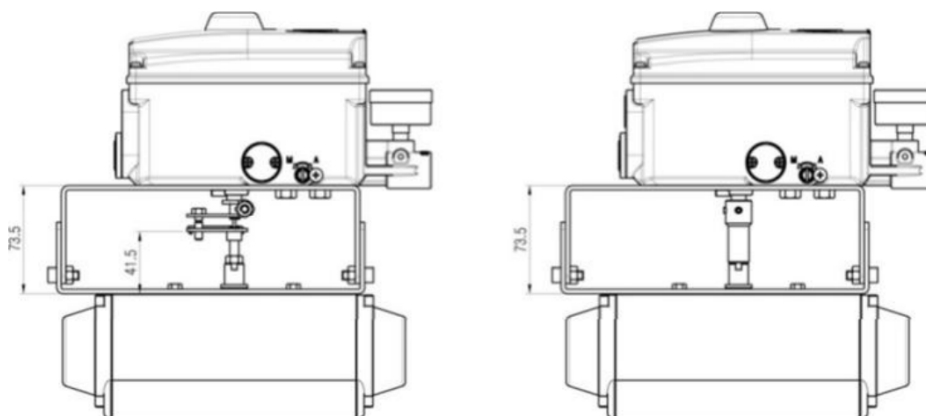
③ Support

② Feedback rod

④ Execution mechanism bracket

3.3 Installation of rotary stroke products

3.3.1 Install example diagram



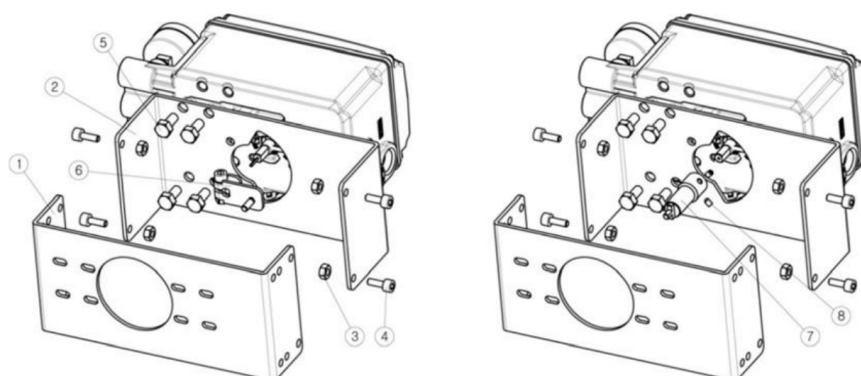
<Example of installation of fork type feedback rod>

<Example of installation of NAMUR type feedback rod>

3.3.2 List of supporting installation parts

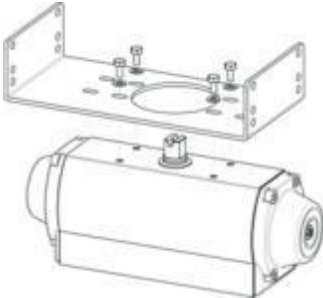
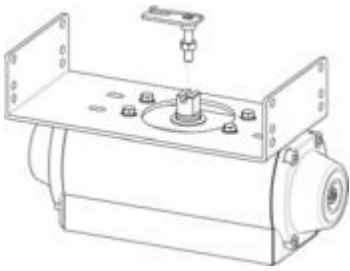
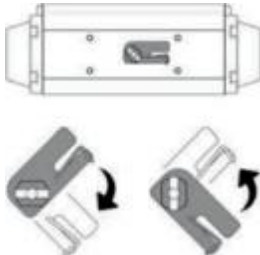
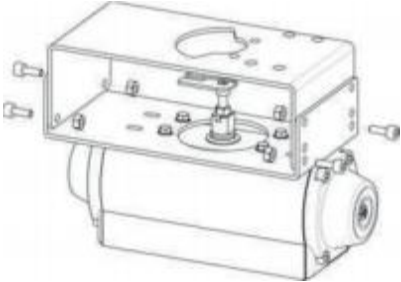
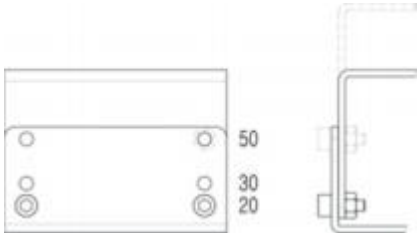
The standard bracket and 1~8 items required for installation are provided when the product is manufactured.

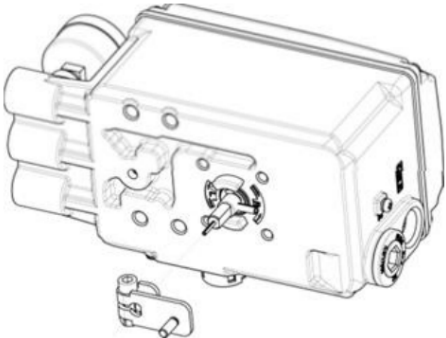
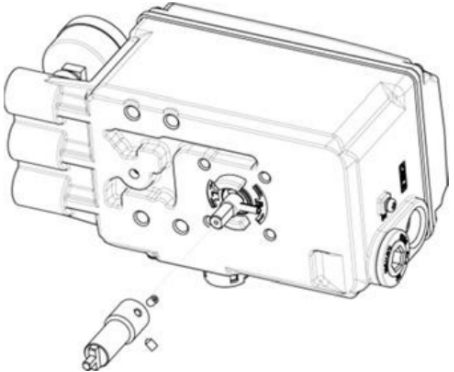
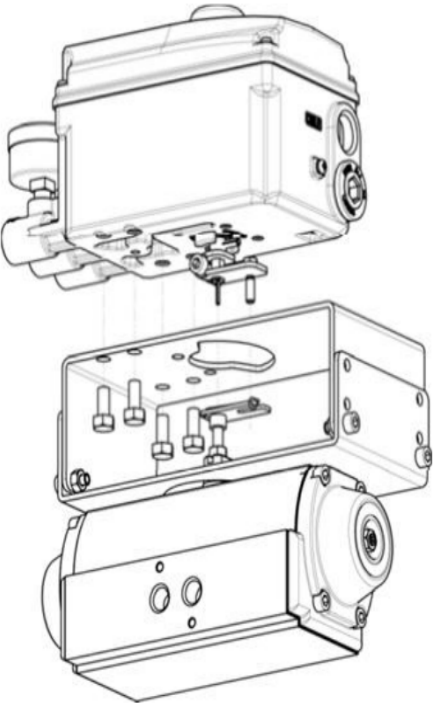
The provided supports comply with the NAMUR (VDI/VDE3835, IEC60534-6-2) specifications.



[Cross-shaped feedback rod]		<NAMUR-shaped feedback rod>	
①	Understand the bracket (1)	⑤	Positioner fixing bolts (M8x4)
②	Upper bracket (1)	⑥	Tapered feedback rod (1)
③	Upper and lower bracket fixing nuts (4)	⑦	NAMUR Conversion connector (1)
④	Upper and lower bracket fixing bolts (M6 x 4)	⑧	NAMUR Fixing screws for the adapter (2)

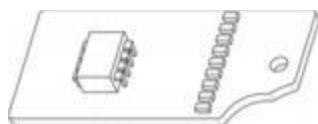
3.3.3 erection sequence

1	Installation of the lower bracket Place the bracket below the cylinder and secure it with screws.	
2	Install the fork feedback rod Turn the fork rod into the actuator shaft. (Step NAMUR is omitted.)	
	According to the rotation direction of the cylinder shaft, please make sure to select the starting point position and fix the locking nut on the fork.	
	Installation of the upper bracket The upper and lower brackets are set.	
3	As shown in the figure on the right, there are 20, 30 and 50 holes on both sides of the lower bracket. Please choose the correct hole according to the height of the row mechanism shaft.	

4	Connection of feedback rod Connection of forked rods Insert the fork rod into the spindle and tighten it The screw on the feed rod is fixed	
	Installation of NAMUR-type connectors Insert the NAMUR adapter into the spindle and tighten the two fixing screws on the adapter.	
5	Connect the locator As shown in the figure on the right, the locator is placed on the upper bracket and fixed with four M8 bolts. At this time, insert the pin at the bottom of the feedback rod into the center hole of the fork rod to make the shaft of the locator and the shaft of the actuator concentric. The NAMUR type is directly inserted into the sub-slot of the actuator shaft and fixed.	

3.4 Installation of the options module

According to the site requirements, you can purchase the corresponding option module separately and install it on the main circuit board. The modules are independently designed and do not affect each other, that is plug and play.



<Valve position feedback module>



[HART communication module]

3.4.1 Installation of valve position feedback module

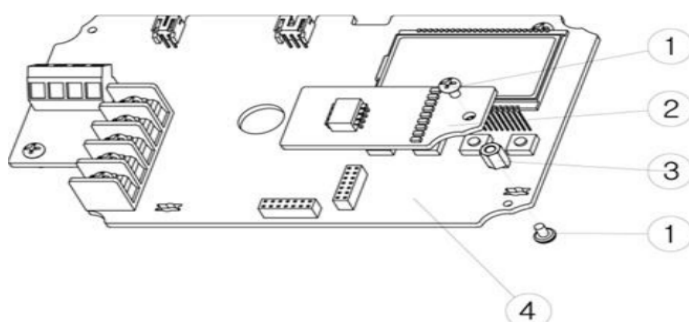
Open the product cover and remove the main circuit board. As shown in the figure below, insert the valve position feedback module into the main circuit board and fix it with screws.



Pay attention to

After adding the feedback module, you must first execute the feedback zero point and end point setting.

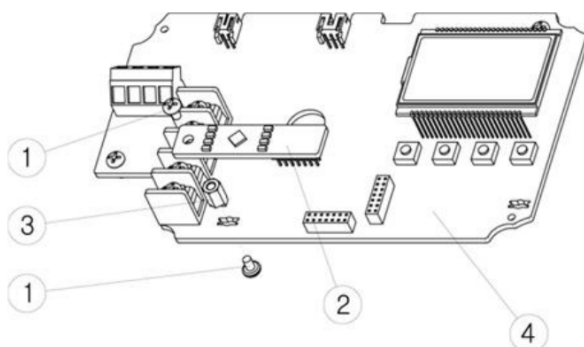
See page 35 for the "OUT ZERO" and "OUT END" Settings.



- ① Module fixed screws
- ② Valve position feedback module
- ③ Module fixed bracket
- ④ Main circuit board

3.4.2 Installation of HART communication module

Open the cover and remove the main circuit board, as shown in the figure below, insert the HART communication module into the main circuit board, and fix it with screws.



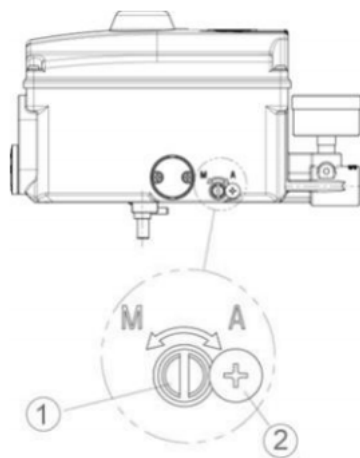
- ① Module fixed screws
- ② HART, communication module
- ③ Module fixed bracket
- ④ Main circuit board

3.5 Automatic/manual switch adjustment method



When the automatic/manual switch is adjusted, the valve will operate. Please pay attention to safety.

- When switched to manual mode, the input air pressure is directly output to the actuator. Therefore, please note that the set pressure of the pressure reducing valve should not exceed the allowable pressure range of the actuator.



- ① Automatic/manual switch
- ② Lock the screws

Explain	• The automatic/manual switch acts as a bypass switch. • When set to automatic mode, the valve opening is adjusted by the locator. • When set to manual, the positioner does not play a regulating role, and the input pressure of the air source is directly input to the air chamber of the actuator through the air circuit inside the positioner.
Use	• When the control valve is faulty, set it to manual mode and confirm whether the valve is operating by adjusting the pressure of the pressure reducing valve. • If the valve is normally open and closed according to the pressure change of the pressure reducing valve, it indicates that the valve is normal and the locator is likely to be out. If the valve does not act, it can be determined as the valve problem.
Adjustment method	• Use a screwdriver to rotate the automatic/manual switch clockwise to the bottom, and set it to automatic. • Set the manual mode by turning the automatic/manual switch counterclockwise with a screwdriver.
Remarks	• The automatic/manual switch only works on single-acting prod-

	ucts and not on double-acting products. The product is set to automatic mode when it leaves the factory.
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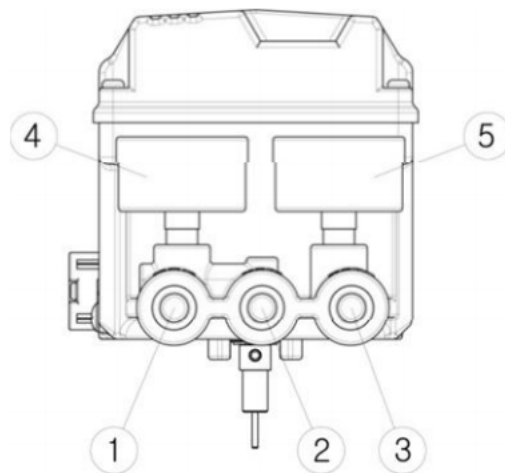
4 Tracheal connection

4.1 Air source conditions

△ Pay attention to

Please use the clean air source for dust removal and dehumidification.
In order to maintain a constant air source pressure, an air filter and pressure reducing valve must be installed at the front end of the air source input.

4.2 Air source interface description



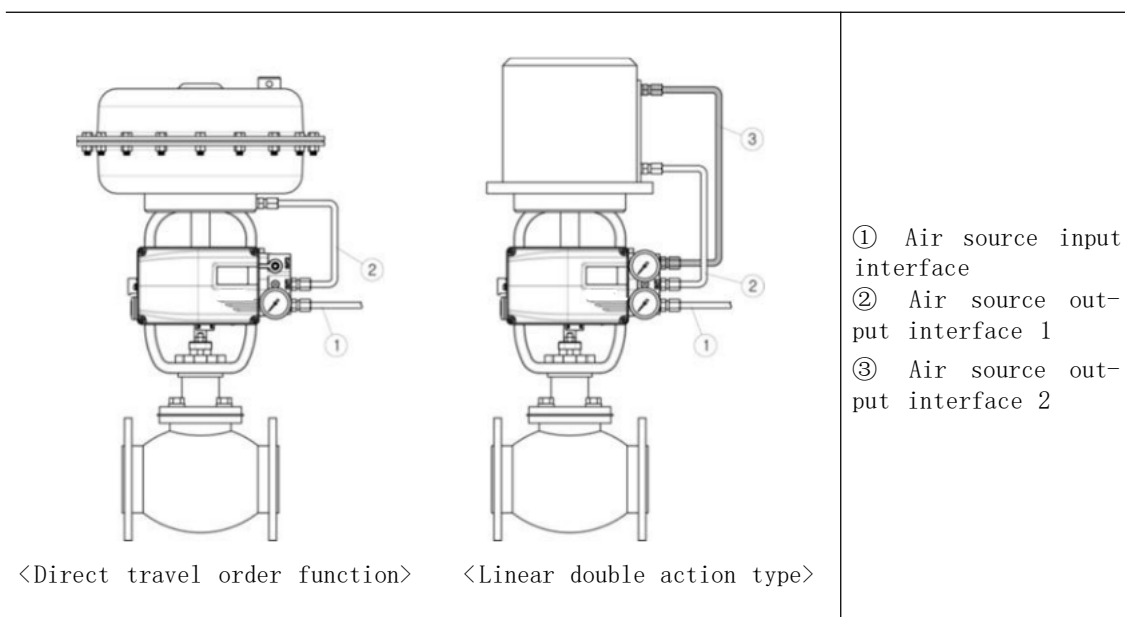
- ① Air source input interface
- ② Export 1 pressure gauge
- ③ Export 2 pressure gauge
- ④ Air source output interface 1
- ⑤ Air source output interface 2

4.3 Tracheal connection

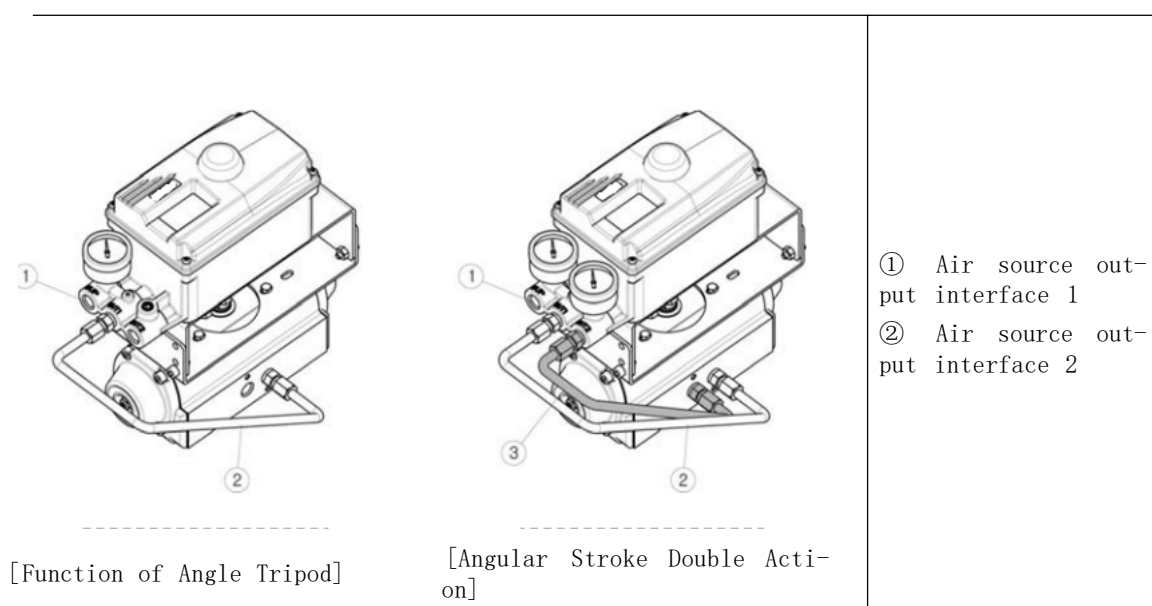
△ Pay attention to

- The product is designed to increase the air pressure at outlet 1 when the current input signal of 4~20mA increases.

4.3.1 Straight stroke type airway connection



4.3.2 A rotary stroke type airway connection



5 Power connection

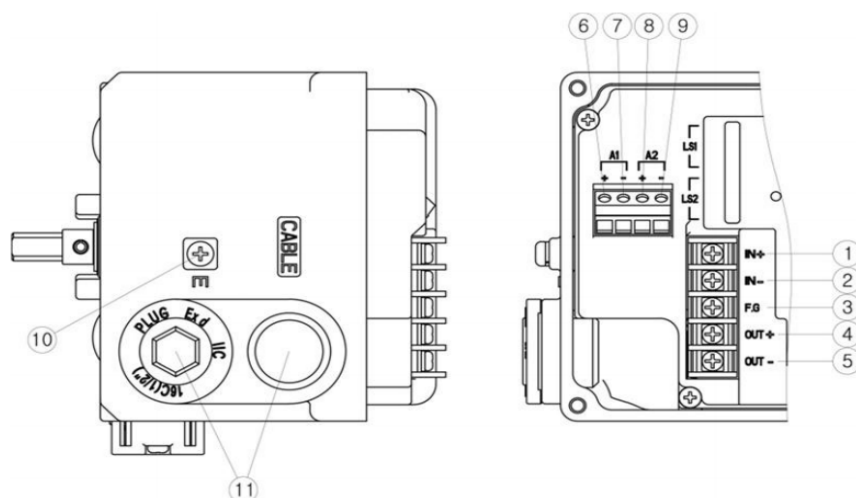
5.1 Cable connections



Warn

Check that the input power supply is within the specified parameters, exceeding the rated value may cause the board to malfunction or burn out the electrical components.

Check the positive and negative polarity of the wires and wire them correctly.

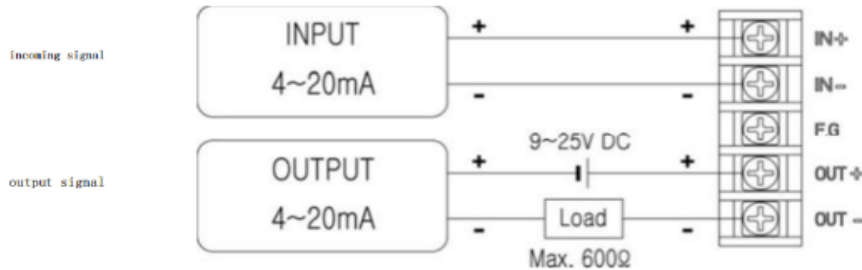


- ① Positive pole of current input signal (+)
- ② Negative pole of current input signal (-)
- ③ Internal grounding terminal
- ④ Positive pole of feedback signal (+)
- ⑤ Negative pole of feedback signal (-)

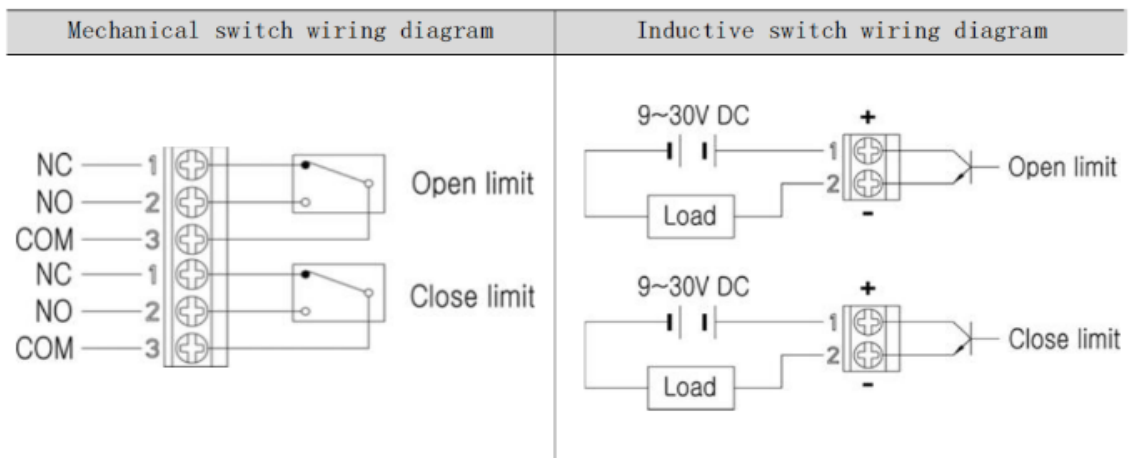
- ⑥ Positive pole of Alarm 1 (+)
 - ⑦ Negative pole of Alarm 1 (-)
 - ⑧ Positive pole of Alarm 2 (+)
 - ⑨ Negative pole of Alarm 2 (-)
 - ⑩ External grounding terminal
 - ⑪ Cable interface
-

5.2 Terminal block description

5.2.1 Input power supply and valve position feedback signal wiring diagram

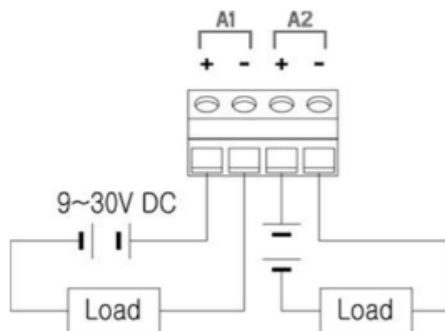


5.2.2 Limit switch wiring diagram



5.2.3 Fault alarm wiring diagram

All products are equipped with a fault alarm function module, which can be selectively connected to the loop according to the site requirements.



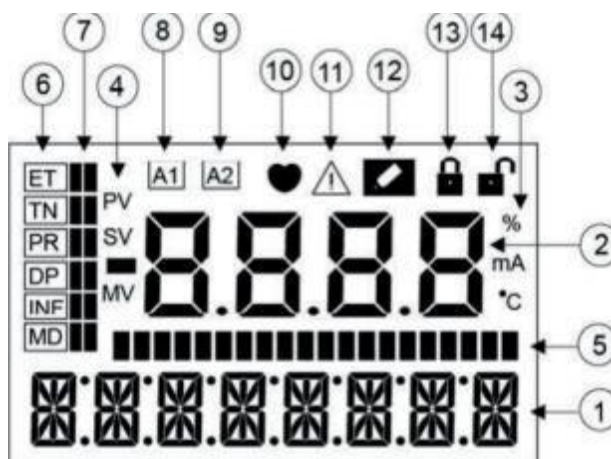
When the system is running normally, the A1 and A2 circuits are disconnected (OFF). However, the circuit is on (ON) when the following conditions occur.

- When the product has a serious fault
- When the product has potential faults
- When the valve is fully open
- When the valve is fully closed

Please refer to page 47 (AL1 URG) and (AL2 URG) for the method of setting.

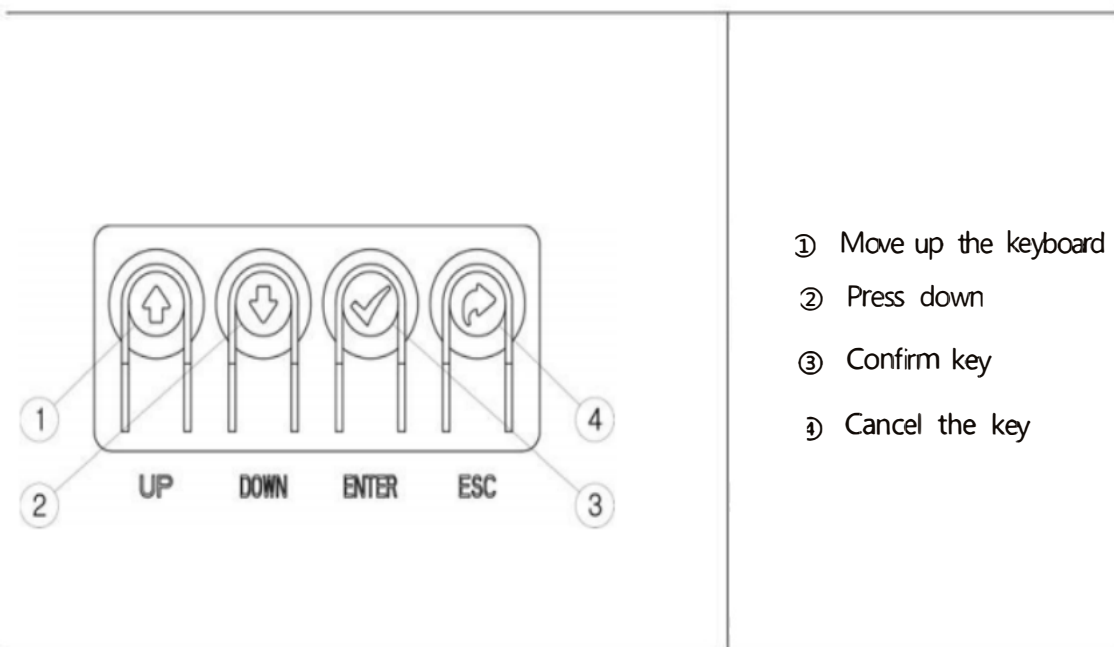
6 Software operation instructions

6.1 LCD screen interface description



Order number	Pattern name	Explain	
①	Menu information	The name of the currently displayed menu (display menu, main menu, subdirectory, etc.)	
②	Menu value	Displays the value of the current menu	
③	Menu value unit	Displays the units for the current menu value (percentage, milliampere, degrees Celsius)	
④	Menu value differentiation	PV	Indicates valve opening value
		SV	Indicates the value of the input signal
		MV	Indicates motor adjustment value
⑤	Bar chart	Displays the status of the current command	
⑥	Primary menu	The main menu currently selected	
⑦	Bar chart	Inform the current main course unit location	
⑧	Fault alarm 1	It is displayed when the fault alarm 1 is set, but not displayed under normal conditions	
⑨	Fault alarm 2	It is displayed when the fault alarm 2 is set, but not displayed under normal circumstances	
⑩	HART, communications status	HART communication is displayed when it is performed, and not displayed when there is no HART communication	
⑪	Fault code	When the product is faulty or has potential faults, the pattern shows up; otherwise, it does not show up	
⑫	Revise	It is displayed when the current parameter value can be modified, but not displayed under normal circumstances	
⑬	Encryption program	The program is in encrypted state, so it is impossible to set or modify internal parameters automatically	
⑭	Decryption procedure	The program is in the decryption state and can automatically set or modify internal parameters	

6.2 Button description



Keystore	Function	Illustrate
ENTER	Confirm	· Execute the current menu command · Save the modified parameter values
ESC	Cancel	· Return to the previous menu menu · Cancels the currently executed command
UP	UP	· Movement between menus at the same level · Increase the value of the parameter to be modified
DOWN	DOWN	· Movement between dishes at the same level · Decrease the value of the parameter you want to modify

6.3 Fast automatic setting method

After opening the lid, you can quickly set it up in the following way.

-
- ① After the program starts with the input of a current signal in the range of 4~20mA, press and hold the <ENTER> key for 3 seconds.
 - ② When "TUNNIG" is displayed, press the <ENTER> key once.
 - ③ When "AUTO RUN" is displayed, press the <ENTER> key once to start the automatic setting process.
-

6.3.1 Automatically set the process to proceed

When automatic setting is performed, follow the following steps.

Depending on the size of the executing agency, the automatic setting steps can be completed in 2~5 minutes.

STEP0	Determine the zero point position of the valve action speed, that is, the reference point of the valve stop.
STEP1	Verify the zero position of the valve, that is, the position of the valve opening at 0%.
STEP2	Confirm the end position of the valve, that is, the position where the valve is open at 100%.
STEP3	Determine the time required to fully open the valve, that is, the time required for the valve to reach the end position from the zero point.
STEP4	Determine the time required to fully close the valve, that is, the time it takes for the valve to reach the zero point from the end point.
STEP5	When the valve stroke is at 25%, the torque motor adjustment signal (BIAS) is set to the low end of the reference value.
STEP6	Check that the torque motor adjustment signal (BIAS) is at a high point reference value when the valve stroke is at 75%.

6.4 Software navigation map

Button description

- After inputting the 4~20mA current signal to start the program, press the <ENTER> key for 3 seconds in the display menu to enter the main directory.
- After selecting the main directory with the <UP> and <DOWN> keys, press the <ENTER> key once to enter the corresponding subdirectory.
- The subdirectory menu can be switched by pressing the <UP> and <DOWN> keys.

Display the menu	MAIN LIN Valve opening%	MAIN IN % Input current signal%	MAIN IN mA Input current signal mA	MAIN VEL Valve action speed	MAIN DEV Travel error%	
Master catalogue	TUNNIG Automatic Settings	PARAMETR Parameter setting	DEVICE P Motion characteristics are set	INFOMATN View information	DIAGNOST Diagnostic mode	EMERGCy Emergency mode
Subdirectory	AUTO RUN Execute automatic setting	DEAD bND Dead zone setting	ACTU SIG Single/dual action Settings	MDL Product model	ERR CODE Error code	PASSWORD Password
	AM FULL Select the automatic setting mode	KP KP value set	ACTU LIN Set the straight/angle stroke	DEVI VER Software release	PST RUN Perform PST functions	EMGY OP Abnormal valve position setting
	VAL OPCL Manual switch valve	KI Set the K value	FORCE OP Force full open signal setting	HART VER HART edition	PST CFG PST parameter setting	FULL OP Manually open the valve fully
	VAL ZERO Valve zero setting	KD Set the KD value	FORCE CL Set the forced shutdown signal	POLL ADD HART address	PST REDy PST execution results	FULL CL Manually close the valve
	VAL END Valve end setting	GKP GKP, value set	DAMP Setting of valve action speed	TRAVEL Cumulative journey	AL1 URG Fault alarm 1 is set	STOP Keep the current valve position
	OUT ZERO Feedback signal zero point setting	GKI GKI, value set	SPLT ZER Set the zero point of the fraction	OP TIME Turn on the cumulative time	AL2 URG Fault alarm 2 is set	UNLOCK Encryption/decryption procedure
	OUT END Set the end point of feedback signal	GKD GKD, value set	SPLT END Set the end point of the fraction	CL TIME Total shutdown time		
	IN ZERO Set the zero point of input signal	KF Anti-friction setting	GOMPENSA The compensation shows the error	DSP NORM The opening is displayed in both directions		
	IN END Set the end point of input signal	CHAR Flow characteristics are set	ACT NORM Action/reaction Settings	TEMPERAT Current ambient temperature		
	BIAS25 Torque motor set value	USER DEF Customize traffic characteristics	OUT NORM Feedback signal is set in both directions	TEMP MAX Record high temperatures		
	BIAS75 Set value of torque motor		HT NORMR HART, positive and negative Settings	TEMP MIN Historic low temperatures		

6.5 Display menu instructions

After the program of the product is started, the LCD screen displays the <MAIN LIN> character indicating the valve opening percentage. At this point, pressing the <UP> or <DOWN> key will switch the display menu. By switching through the display menu, you can confirm the valve opening percentage, the actual current input signal size, and other information, but you cannot change parameters or execute task commands.

Display the menu	Explain	
MAIN LIN Valve opening	Displays the current valve opening percentage and the current flow characteristic setting status. Depending on the flow characteristic setting status, one of the following five displays is displayed.	
	Show value	Explain
	MAIN LIN	Indicates that the flow characteristics are set to linear.
	MAIN EQ1	Indicates that the flow characteristic is set to equal percentage 1.
	MAIN EQ2	Indicates that the flow characteristic is set to equal percentage 2.
	MAIN QO	Indicates that the flow characteristic is set to fast open.
	MAIN USR	Indicates that the flow characteristics are set to 17 user-defined points.
MAIN IN % Input current signal%	The actual current signal received by the locator is displayed as a percentage. - If the percentage of the current signal input by the control room or manual controller is different from that recognized by the positioner, please confirm whether the power supply of the input signal is normal. - If the current signal source is normal, please enter the subdirectory <IN ZERO> and <IN END> of the TUNNING main directory, and reset the zero point (4mA) and end point (20mA) of the input signal.	
MAIN IN mA Input current signal mA	The magnitude of the current signal received by the locator is displayed in milliamps. - If the current signal input by the control room or manual controller is different from the current value identified by the positioner, please confirm whether the power supply of the input signal is normal. - If the current signal source is normal, please enter the subdirectory <IN ZERO> and <IN END> of the TUNNING main directory, and set the zero point (4mA) and end point (20mA) of the	

	input signal.
MAIN VEL Valve action speed	The valve action speed is displayed by numbers The speed of the action is between -2047 and +2048. The negative number represents the speed at which the valve opens, the positive number represents the speed at which the valve closes, and 0 represents the stop. The greater the absolute value, the faster the speed of the action.
MAIN DEV Travel error	Displayed as a percentage, the error between the input current signal percentage and the current valve opening percentage. The greater the error percentage, the worse the action characteristics, and 0 represents normal action performance.

6.6 Main directory description

The main directory is a menu that categorizes multiple parameters and commands into six categories by function.

Enter the method

- After the input 4~20mA signal product starts, press the <ENTER>3 key for seconds to enter the main directory mode.
- After entering the main directory, you can switch between the main directories by pressing the UP or DOWN keys.
- Press the ENTER key once for the selected main directory to enter the subdirectory of the corresponding main directory.

Master catalogue	The main function of the subdirectory
TUNNING Automatic set mode	Automatic setting is performed Change the zero and end point of the valve Change the zero and end point of the feedback signal
PARAMETR Parameter setting	Dead zone setting Change the PID value to change the flow characteristics
DEVICE P Motion characteristics are set	• The action speed of the valve is adjusted according to the single/dual action form set by the actuator and the direct/angle stroke set by the actuator to adjust the forced fully open/forced fully closed function - Set up positive/negative effects
INFOMATN View information	Confirm the product model Verify software and HART version • Confirm the time required to fully open/close • Confirm the current ambient temperature, historical maximum temperature, and historical minimum temperature
DIAGNOST Diagnostic mode	Confirm the fault code Set part of the trip test function (PST) Set fault alarm function (ALARM)
EMERGNcy Emergency mode	Set valve position (fully open, fully closed, or maintain current position) in case of abnormality. Manually force fully open, fully closed, or maintain current valve position Encryption (LOCK) or decryption (UNLOCK) program

6.7 Sub - directory Instructions

The following is a detailed description of the functions of the sub - directories corresponding to the main directory and the parameter setting methods.

- Press the key once in the home directory <ENTER> to enter the corresponding subdirectory.
- Subdirectories can be switched between them using a <UP>key or <DOWN>key.

A subdirectory of TURNING

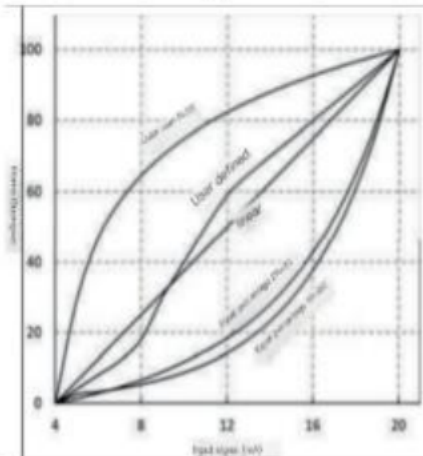
subdirectory	Feature description	
AUTO RUN Perform automatic settings	Set it automatically. · It can be automatically set for any signal in the range of 4~20mA. · It takes 1~3 minutes to set the completion time automatically according to the size of the actuator	
	warn	
	During this process, the valve will move up and down, please pay attention to safety.	
AM Select the auto-set mode	Select the auto-set mode. Selective settings can be made according to the site conditions, and this process is added The time is set automatically and other parameters can be avoided.	
	Selectable mode	illustrate
	AM FULL	Reset all parameters.
	AM BIAS	Reset the motor adjustment value, but do not change other parameters.
	AM PIDb	Resets the PID setting without changing other parameters.
	AM ZEb R	Resets the zero and end positions of the valve, but does not change other parameters
VAL OP / C L Manually open and close the valve	Factory set value	AM FULL
	Independent of the current input signal, the <UP><DOWN>valve can be opened and closed manually by or with a button.	
VALZERO Valve zero setting	Manually set the zero position of the valve. Enter 4mA, press <UP>or <DOWN>key to select the zero position of the valve and press <ENTER>key to save, the positioner defaults to this position as the zero position of the valve.	
VAL END Valve end setting.	Manually set the end position of the valve. Enter 20mA, press <UP>or <DOWN>key to select the end position of the valve <ENTER>key to save, the positioner defaults to this position as the end position of the valve.	

OUT ZERO Feedback signal zero point setting	Manually set the zero point position of the valve position feedback signal. Enter the 4mA current signal to make the valve reach the zero point position, change the value by pressing the <UP> or <DOWN> key, and press the <ENTER> key to save. Confirm whether the feedback current signal is 4mA, and if there is a deviation, continue to change the corresponding value until the feedback 4 mA current signal.  Pay attention to After adding the feedback module, you must first perform a feedback zero setting.
OUT END Set the end point of feedback signal	Manually set the end position of the valve position feedback signal. Enter 20mA current signal to make the valve reach the zero point position, change the value according to <UP> or <DOWN>, and press <ENTER> key to save. Confirm whether the feedback current signal is 4mA, if there is a deviation, continue to change the corresponding value until the feedback 20mA current signal is 4mA.  Pay attention to After adding the feedback module, you must first execute the feedback endpoint setting.
IN ZERO Set the zero point of input signal	Set the zero position of the input signal. If the current input signal identified by <MAIN IN%> or <MAIN mA> in the display menu is different from the actual input current size, you can set it through this menu. Enter 4mA in this menu and press <ENTER> twice to save.  Pay attention to After changing the circuit board or initializing the program, you must first set the zero value of the input signal.
IN END Set the end point of input signal	Set the end position of the input signal. If the input current signal identified by <MAIN IN%> or <MAIN mA> in the display menu is different from the actual input current size, you can set it through this menu. Enter 20mA in the menu and press 2 <ENTER> keys to save.  Pay attention to After changing the circuit board or initializing the program, you must first set the end value of the input signal.
BIAS25 Set value of torque motor	The valve stroke is at the base value of the position torque motor at 25%. This value is automatically saved after the setting is set, and the user does not need to change the setting.
BIAS75 Torque motor set value	The valve stroke is at 75% of the base torque of the motor. This value is automatically saved after the setting is set, and the user does not need to change the setting value.

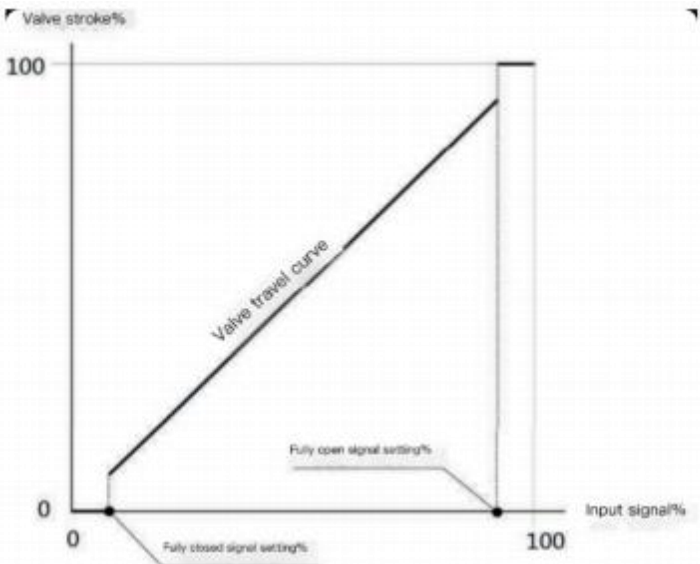
A subdirectory of PARAMETR

Subdirectory	Function declaration	
DEAD BND Dead zone setting	Dead zone range, that is, the allowable error range. - When the valve stem friction force is too large and the oscillation phenomenon occurs, the oscillation phenomenon can be solved by increasing the dead zone percentage within the allowable range on site. - If the set value is too large, the adjustment accuracy will decrease.	
	Range of set value	0~100%
	Set value at time of delivery	0.3%
KP KP value set	P is the proportional constant value of the regulating signal during the process of reaching the target. - When the KP value is too large, the speed to reach the target value is accelerated, but it is easy to oscillate. - When the KP value is too small, the valve stability is improved, but the adjustment speed is slower.	
	Range of set value	0~500.0
	Set value at time of delivery	Indefinite
KI Set the K value	The I adjustment value is the integral constant value that compensates for the percentage error during the process of reaching the target. - If the set value of K is too large, the time to reach the target is accelerated, but it is easy to produce oscillation phenomenon. - If the value of the Ki setting is too small, the time to reach the target becomes slower.	
	Range of set value	0~500.0
	Set value at time of delivery	Indefinite
KD Set the KD value	D adjustment value, that is, the differential constant value of adding or subtracting the percentage error during the process of reaching the target. - If the KD setting is too large, the speed to reach the target is slower. - If the KD setting value is too small, it is easy to produce oscillation phenomenon.	
	Range of set value	0~500.0
	Set value at time of delivery	Indefinite
GKP GKP value set	P is the proportional constant value of the regulating signal during the process of reaching the target. It has the same function as the above KP adjustment value. When the valve stroke enters the error range of $\pm 1\%$, the KP setting value does not play a role, and the GKP setting value is applicable.	
	Range of set value	0~500.0
	Set value at time	Indefinite

	of delivery	
GKI GKI value set	The adjustment value is the integral constant value that compensates for the percentage error during the process of reaching the target. It has the same function as the above KI adjustment value. When the valve stroke enters the error range of $\pm 1\%$, the KI setting value does not work, and GKI is applicable, setting value.	
	Range of set value	0~500.0
	Set value at time of delivery	Indefinite
GKD GKD value set	D adjustment value, that is, the differential constant value for adding or subtracting the percentage error during the process of reaching the target. It has the same function as the above KD adjustment value. When the valve stroke enters the error range of $\pm 1\%$, the KD set value does not play a role, and GKD is applicable, and the set value is set.	
	Range of set value	0~500.0
	Set value at time of delivery	Indefinite

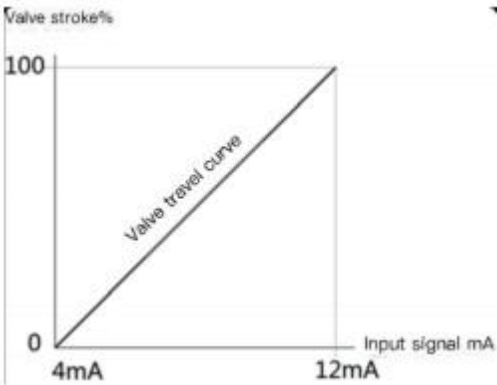
KF	The adjustment value to overcome the friction of the valve.																																																																																																												
	Increasing the KF value can improve the oscillation caused by excessive stem friction in the valve.																																																																																																												
	Set value range	0~500.0																																																																																																											
Anti-friction setting	Set at the factory	0																																																																																																											
CHAR	Flow curve characteristics setting																																																																																																												
																																																																																																													
	<table><tr><th>Signal</th><th>Linear</th><th>EQ1</th><th>EQ2</th><th>Hurry up</th><th>User</th></tr><tr><td>4</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>5</td><td>6.2</td><td>2.5</td><td>1.3</td><td>29.</td><td>4</td></tr><tr><td>6</td><td>12.</td><td>3.2</td><td>2.8</td><td>46.</td><td>8</td></tr><tr><td>7</td><td>18.</td><td>4.1</td><td>4.5</td><td>57.</td><td>1</td></tr><tr><td>8</td><td>25</td><td>5.3</td><td>6.5</td><td>64.</td><td>1</td></tr><tr><td>9</td><td>31.</td><td>6.7</td><td>8.9</td><td>70.</td><td>3</td></tr><tr><td>1</td><td>37.</td><td>8.6</td><td>11.</td><td>74.</td><td>4</td></tr><tr><td>1</td><td>43.</td><td>11.</td><td>14.</td><td>78.</td><td>5</td></tr><tr><td>1</td><td>5</td><td>14.</td><td>18.</td><td>82.</td><td>5</td></tr><tr><td>1</td><td>56.</td><td>18.</td><td>22.</td><td>85.</td><td>6</td></tr><tr><td>1</td><td>62.</td><td>23.</td><td>27.</td><td>87.</td><td>7</td></tr><tr><td>1</td><td>68.</td><td>29.</td><td>34.</td><td>90.</td><td>7</td></tr><tr><td>1</td><td>7</td><td>37.</td><td>42.</td><td>92.</td><td>8</td></tr><tr><td>1</td><td>81.</td><td>48.</td><td>52.</td><td>94.</td><td>8</td></tr><tr><td>1</td><td>87.</td><td>61.</td><td>65.</td><td>96.</td><td>9</td></tr><tr><td>1</td><td>93.</td><td>78.</td><td>80.</td><td>98.</td><td>9</td></tr><tr><td>2</td><td>10</td><td>10</td><td>10</td><td>10</td><td>1</td></tr></table>		Signal	Linear	EQ1	EQ2	Hurry up	User	4	0	0	0	0	0	5	6.2	2.5	1.3	29.	4	6	12.	3.2	2.8	46.	8	7	18.	4.1	4.5	57.	1	8	25	5.3	6.5	64.	1	9	31.	6.7	8.9	70.	3	1	37.	8.6	11.	74.	4	1	43.	11.	14.	78.	5	1	5	14.	18.	82.	5	1	56.	18.	22.	85.	6	1	62.	23.	27.	87.	7	1	68.	29.	34.	90.	7	1	7	37.	42.	92.	8	1	81.	48.	52.	94.	8	1	87.	61.	65.	96.	9	1	93.	78.	80.	98.	9	2	10	10	10	10
Signal	Linear	EQ1	EQ2	Hurry up	User																																																																																																								
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7	18.	4.1	4.5	57.	1																																																																																																								
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	CHAR QUI	Hurry up																																																																																																											
	CHARUSR	User-defined 17 points																																																																																																											
	Set at the factory	CHRT LIN																																																																																																											
USER DEF	User-defined 17-point setting. In addition to the above-mentioned typical flow characteristics such as linearity, equal percentage, and quick opening, special flow curve control can be achieved by setting the corresponding valve stroke position of 4~20mA																																																																																																												
	Set the contents	Set the valve stroke position according to the input signal																																																																																																											
	USR P0	Valve stroke position at 4mA																																																																																																											
	USE P1	Valve stroke position at 5mA																																																																																																											
	USRP2	Valve stroke position at 6mA																																																																																																											
	USR P3~16	7~19mA is set according to the above steps																																																																																																											
	USR P17	Valve stroke position at 20mA																																																																																																											

A subdirectory of DEVICE P

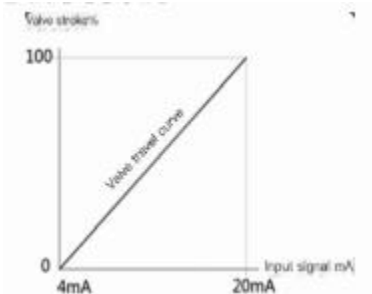
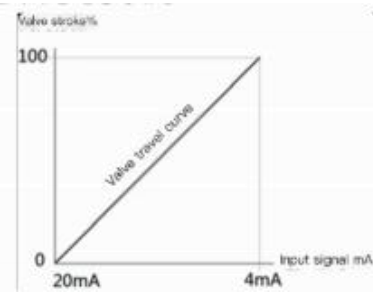
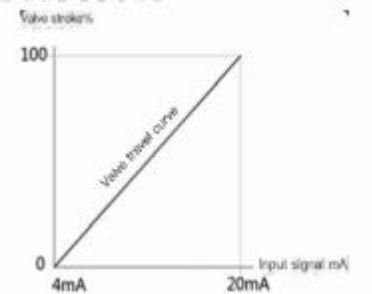
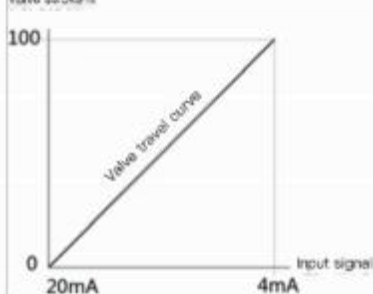
Subdirectory	Function declaration		
ACTU SNG Single/dual action Settings	Single action or double action is set according to the form of the executive agency.		
	 Pay attention to		
	If the set value does not match the function of the actuator, the product accuracy will be affected.		
	Settable values	ACTU SNG	Single-action
		ACTU DbL	Double-acting
	Set value at time of delivery	ACTU SNG	
ACTU LIN Set the straight/angle stroke	According to the valve and actuator form, set linear or angular travel.		
	 Pay attention to		
	If the set value does not match the valve or actuator form, the product accuracy will be affected.		
	Settable values	ACTU LIN	Straight stroke
		ACTU ROT	Linear stroke
	Set value at time of delivery	ACTU LIN	
FORCE OP Force the full open signal	Set the percentage of the forced full open signal. When the input signal is greater than the set value, the output pressure value set by the pressure reducing valve is supplied to the actuator, so that the valve is fully open.		
			
	Set the range of values	0~100%	
	Set value at	100%	

	time of delivery	
	Remarks	This function does not work when set to 100%.

FORCE CL Force a shutdown signal	Set the percentage of forced shutdown signals. (Refer to the previous page figure) When the input signal is less than the set value, the air pressure in the chamber of the actuator connected to the outlet 1 is forced to empty, so that the valve is fully closed.	
	A range can be set	0~100%
	Set value at time of delivery	0.3%
	Remarks	This function does not work when set to 0%.
DAMP Valve action speed	The valve action speed can be set. The larger the set value, the slower the valve action speed. Through this function, the oscillation phenomenon of small actuators can be solved.	
	A range can be set	0~10%
	Set value at time of delivery	0%
	Remarks	This function does not work when set to 0%.
SPLT ZER Set the zero point of the fraction	When performing process control, set the percentage of zero signal. For example, set it to 50%, as shown in Figure 12mA signal corresponding to valve 0% position.	
	A range can be set	0~100%
	Set value at time of delivery	0%
SPLT END Set the end point of the fraction	When performing process control, set the percentage of end point signal. For example, set it to 50%, as shown in Figure 12mA corresponding to valve 100%.	



A range can be set	0~100%
Set value at time of delivery	0%

COMPENSA The compensation shows the error	Correct the error between the percentage of the opening of the LCD display and the actual percentage of the valve travel. For example, the effective rotation Angle of ST-6 is 60 degrees, but because the effective rotation Angle is too small due to installation problems, there will be an error between the LCD display percentage and the actual valve travel percentage. At this time, the error can be compensated by adjusting the "COMPENSA" percentage.	
	 Pay attention to	
	This function is applied to the linear stroke product, and the angular stroke product must be set to 0%.	
	Settable values	0~100%
	Set value at time of delivery	Straight stroke: 2% Linear stroke: 0%
ACT NORM Action/reaction setting	Change the valve action form.	
	Retroaction (RA)  Positive effect (DA) 	
	Settable values	ACT NORM ACT REVE
	Set value at time of delivery	Retroaction Positive effect
	Set value at time of delivery	ACT NORM (reactive)
OUT NORM Feedback signal positive/negative Setting	The valve position feedback signal is output at the same percentage or opposite percentage of the valve travel.	
	Positive output (DA)  Inverted output (RA) 	
	Settable values	OUT NORM OUT REVE
	Set value at time of delivery	Positive feedback output Reverse feedback output
	Set value at time of delivery	Positive output (OUT NORM)

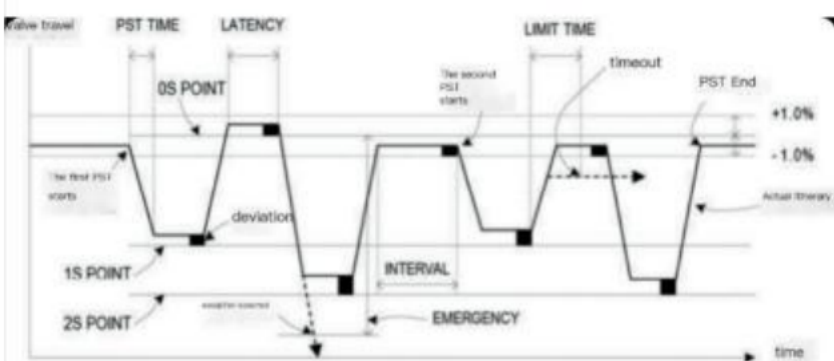
	ery		
HT NORM HART signal positive / Counter assu- ptions	The HART communication signal adjusts the valve opening in either forward or reverse direction.		
	Settable values	HT NORM	Forward direction
		HT REVE	Opposite direction
	Set value at time of deliv- ery	HT NORM (positive)	

A subdirectory of INFOMATN

The following information can be confirmed through the subdirectory.

Subdirectory	Function declaration	
MDL	Display the model number of the product.	
DEVI VER	Display the software version.	
HART VER	Displays the HART communication protocol version.	
POLL ADD	Protocol address used for HART communication.	
TRAVEL	The cumulative stroke value of the valve action after the locator is started is displayed as (K%). The travel distance of the valve from fully closed to fully open is measured in 100%=0.001K%. For example, the travel value (TRAVEL) shows 1K%, which means that the valve has moved 1000 times in percentage of travel.	
OP TIME	Time required for valves to go from fully closed to fully open when automatic setting is performed. Unit: seconds	
CL TIME	Time required for valves to go from fully open to fully closed when automatic setting is performed. Unit: seconds	
DSP	The valve opening is displayed in positive or reverse direction on the LCD.	
	Settable values	Explain
	DSP NORM Positive display	When the valve opening is 0%, the LCD screen displays 0%; when the valve opening is 100%, the LCD screen displays 100%.
	DSP REVE Reverse video	When the valve opening is 0%, the LCD screen shows 100%; when the valve opening is 100%, the LCD screen shows 0%.
	Set value at time of delivery	DSP NORM (positive display)
TEMPERAT	The current ambient temperature is confirmed by the temperature sensor built into the circuit board.	
TEMP MAX	The highest historical ambient temperature value after the product is first used.	
TEMP MIN	The minimum historical ambient temperature value for the product after it is first used.	

DIAGNOST SUBDIRECTORY

Subdirectory		Feature description		
ERRCODE Fault codes		Displays the product fault code. Problems that arise during debugging or operation can be resolved by confirming fault codes. For details, please refer to the Fault Code Description section. (See page 49)		
PST RUN Perform PST function		Set whether to perform the PST function or not.		
		PST Meaning	The Partial Stroke Test function is one that does not affect the field. Within the scope of the flow system process, the valve is adjusted in a small range to prevent the valve stem from tightening due to long-term maintenance of a certain position, and to ensure the normal operation of the valve in an emergency	
		Configurable values	PST RUN	Perform PST function
			PST OFF	Turn off the PST feature
Factory set value		PST OFF (Turn off the PST feature)		
PST CFG PST parameter setting		Set the necessary parameters for the Partial Stroke Test Function (PST). The PST function execution process diagram and the specific parameters to be set are as follows.		
				
		Parameter	Illustrate	
		OSPOINT	Set the PST starting valve stroke position. THE VALVE STROKE POSITION IS WITHIN ±1% OF THE STARTING SET POSITION "OS POINT" TO START THE PST, AND IF IT IS OUTSIDE THIS RANGE, WAIT UNTIL THE VALVE STROKE ENTERS THIS RANGE BEFORE STARTING THE PST	
			Set value range	0~100%
			Factory set value	100%
		1S POINT	Set the first target value of PST.	
			Set value range	0~100%
Factory set value	90%			

	2N POINT	Set the second target value of PST.	
		Range of set value	0~100%
		Factory set value	80%
	INTERVAL	After executing the first PST, wait for the standby time before executing the second PST. When running the PST function, perform the same steps twice in total. Successfully reaching the first target value "1S POINT" and the second target value "2S POINT" marks the completion of the first execution. After the time set by "INTERVAL", proceed with the exact same process as the first execution.	
		Range of set value	1 to 100 seconds
		Factory set value	20 second
	LATENCY	When the PST function is executed, after reaching the first target value "1S POINT", it goes to the standby time of the second target value "2S POINT". That is, after successfully reaching the first target value, the valve returns to the starting position and waits for the time set by "LATENCY" before going to the second target value "2S POINT".	
		Range of set value	1 to 100 seconds
		Factory set value	10 second
	LMT TIME	The time to reach the target value is allowed. If the time to reach the target value exceeds the set "LMT TIME" time or the valve does not move during the execution of PST, the execution of PST is judged to fail, the execution of PST function is stopped, and the valve position returns to the position before the execution of PST.	
		Range of set value	0~100 seconds
		Factory set value	5 second
	EMERGENCY	The allowable error range is allowed during the execution of PST. That is, during the execution of PST, if the valve position exceeds the "EMERGENCY" set value, the PST function is stopped and the valve position returns to the previous position of PST.	
		A range can be set	0~100%
		Factory set value	15%

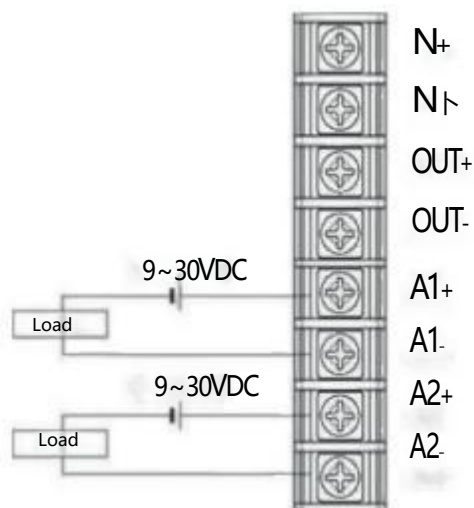
PST REDy PST execution results	Confirm the execution results of the PST function. During the execution of PST, the LCD screen displays the following information according to the set value and the execution result. Please refer to the following table to confirm the execution result information of PST.	
	Show value	Explain
	PST REDy	PST is about to be executed.
	PST SUCS	The PST execution was successful.
	PST TOUT	"LMT TIME" fails to reach the target value within the set time value range.
	PST FIXD	The valve is not moving.
	PST DOUT	More than 1% above the target value.
	PST EMRG	Exceeds the allowable valve position error range, that is, exceeds the "EMERGENCY" set value.

AL1 URGT Fault alarm 1

Set the parameters of fault alarm 1.

When the tracker has a serious fault, or has a hidden danger of failure, etc., and the following setting value is met, the loop remains on (ON) state, and at the same time, it appears above the LCD screenA1

The loop remains closed (OFF) during normal operation.



Configurable values

illustrate

AL1 URGT

When there is a serious failure of the product
When the "Fault Level" value is 0 in the fault code (see page 46)

AL1 PRI 1

When there is a hidden danger of failure of the product
When the Fault Level value is 1 in the fault code (see page 46)

AL1 F CL

When the valve is fully closed

AL1 F OP

When the valve is fully open

AL1 NONE

Not with this feature

Factory set value

AL1 URGT

AL2 URGT Fault alarm 2

Set the parameters of fault alarm 2.

When the positioner has a serious fault, or has a hidden danger of failure, etc., and the following setting value is met, the loop will be maintained A2

The specific functions are the same as those of "AL1 URGT", and "AL1 URGT" and "AL2 URGT" can be set with different functions.

Configurable values

Same as AL1 URGT above

Factory set value

AL2 URGT

A subdirectory of EMERGNcy

Subdirectory	Function declaration		
PASSWORD Enter password	Enter the "EMERGNCy" subdirectory and display the "PASSWORD" menu. At this time, you must enter the password to enter. The password is as follows.		
	Set value at time of delivery	Press the UP> ENTER> DOWN> UP keys in sequence. That is, press the buttons from left to right 1321.	
	Remarks	This password cannot be changed by the user.	
EMGY OP Abnormal valve position Setting	When the locator has abnormal action, you can set the position that the valve should maintain. You can set the following four positions.		
	Settable values	EMGY None	No action was taken.
		EMGY Open	Open the valve fully.
		EMGY Close	Close the valve fully.
		EMGY Stop	Keep the valve in its current position.
Set value at time of delivery	No action taken (EMGY NONE)		
FULL OP Manually open the valve fully	Manually open the valve. After setting this function, the product remains in an open state and is not affected by changes in the input signal.		
FULL CL Manually close the valve	Manually close the valve. After setting this function, the product remains in the fully closed state and is not affected by changes in input signals.		
STOP Keep the current valve position	Keep the current valve opening, regardless of the input signal. After setting this function, the product keeps the current valve position open state, regardless of the input signal change.		
Lock or UNLOCK Encryption/decryption procedure	Prevents changes to internal parameters and acts as an encryption program.		
	 Pay attention to		
	When set to encryption (LOCK), all modification commands including automatic setting and PID parameter adjustment cannot be performed.		
	Settable values	UNLOCK	Deciphering
		LOCK	Encryption
Set value at time of delivery	UNLOCK (Decrypted)		

7 Fault code and description

7.1 Error code description when automatic setting is performed

When automatic setting is performed, if there is a problem, the following error code will appear on the LCD

Refer to the following table to confirm the cause and solve the problem.

	Error code	Failure cause	Resolvent
1	STEP0 VO	When setting automatically, first confirm the valve In a static state, but if its long The time valve cannot stop and this code will appear.	Replace the circuit board.
2	STEP1 PZ	The zero position of the feedback rod is outside the effective turning range of the locator.	① Confirm whether the locator installation status is correct. ② Re-adjust the position of the locator to improve the zero position of the feedback rod.
3	STEP2 PE	The position of the feedback rod end is outside the effective turning range of the locator.	① Confirm whether the locator installation status is correct. ② Re-adjust the position of the locator to reduce the end position of the feedback rod.
4	ACT TYPE	The feedback rod zero position and end point position data detected during self-inspection are too close.	① Confirm whether the gas source input is normal. ② Confirm whether the feedback rod Angle is too small. The effective Angle of the linear stroke product should be at least greater than 40 degrees, and the best Angle is 60 degrees. ③ Poor contact between the potentiometer and the circuit board. Open the housing, pull out the potentiometer connector, and reinsert it into the circuit

			board. ④ Replace the circuit board.
5	STEP3 CT	The valve was closed for too long.	① Confirm whether the feedback rod is loose. ② The zero position of the valve changes, and the automatic setting is repeated 2~3 times. ③ The actuator is very large. Refer to page 37 of the manual and enter the sensitivity adjustment TbL menu to set TbL. After the NS value is changed to TbL4 LLS, 4 is automatically set.
6	STEP4 OT	The valve was left open for too long.	① Confirm whether the feedback rod is loose. ② The actuator is very large. Refer to page 37 of the manual and enter the sensitivity adjustment TbL menu to set TbL.

8 Warranty period and disclaimer

- The manufacturer's warranty period for the product is 18 months from the date of factory delivery.
- Any malfunction or damage due to product quality during the warranty period will be repaired free of charge or replacement products or necessary repair parts will be provided.
- This limited warranty applies only to our products and does not cover any other damage caused by product failure.
- The manufacturer's warranty is invalid if the problem is not due to product quality problems, but due to failure to comply with the contents of this manual, neglect of this manual, failure to use under the guidance of qualified personnel or unauthorized changes.