

Installation and Maintenance Manual

Smart Valve Positioners SS3L / SS3R Series



SOFTWARE 2.07 VERSION

Contents

1. Safety Instructions / Precautions	2	11.5.3 Selection of Linear, E.Q.%, Quick Open, User Set (17points)	
2. Overview of Structure	3		
3. Specifications	4	11.5.4 Span Adjustment	36
4. Part Numbering System (Order Code)	5	11.5.5 Zero Adjustment	
5. Principle of Operation	6	11.5.6 PID-Gain	37
6. Descriptions of LCD Display and Buttons	7	11.5.6.A P-Gain	
7. Installation	8	11.5.6.B I-Gain	
7.1 Mounting onto Linear Actuator		11.5.6.C D-Gain	
7.2 Mounting onto Rotary Actuator	12	11.5.6.D GROP-Gain	
8. Air Connections	15	11.5.7 Control Speed adjustment	39
8.1 SS3L(linear type)		11.5.7.A SPEED	
8.2 SS3R(rotary type)		11.5.7.B SWST	
9. Electrical Connections	16	11.5.7.C CNLT	40
9.1 Terminal Block		11.5.7.D GCNL	
9.2 Measuring Output Signal	17	11.5.8 Setting of Dead Band	
9.2.1 With mA Loop Calibrator		11.5.9 D-gain setting for hard mode	41
9.2.2 With Multi-meter		11.5.10 Control Mode	
9.3 Wiring Alarm Limits		11.5.11 SUB-Parameter	42
9.4 Wiring SPDT Micro Switches		11.5.11.A Valve Shut-Off Setting	
9.5 Setting SPDT Micro Switches	18	11.5.11.B Valve Full Open Control	43
10. Quick Auto-Calibration	19	11.5.11.C Setting of Output Signal	
10.1 Quick Auto-Calibration		11.5.11.D Split Range Setting	
10.2 Span Adjustment		11.5.11.E Chang of Decimal Display	
10.3 P-Gain Adjustment	20	11.5.11.F Setting of Alarm Limits	44
10.4 Checking Ambient Temperature		11.5.11.G Setting of Input Signal	46
11. Description of Parameters Flow	25	11.5.11.H Setting of Output Signal	
11.1 Parameters Flow Diagram		11.5.11.I HART Polling Address	47
11.2 Main Menu	26	11.5.11.J Partial Stroke Test	
11.3 Parameters	27	12. Maintenance / Service	48
11.4 Setting Main Parameters	28	12.1 Preliminary Check Points	
11.4.1 LOCK ON / OFF		12.2 Module Parts	
11.4.2 Display Mode		12.3 Re-setting of Potentiometer	
11.4.3 Manual Mode	29	13. Troubleshooting	49
11.4.4 Monitor Mode	30	13.1 Error Codes and Recommended Actions	
11.4.5 Auto-Calibration Mode	31	13.2 Checking Diagram for Stable Control	53
11.4.5.A Performing Auto-Calibration		14. Spare Parts	50
11.4.5.B Initializing Parameters		14.1 SS3 Spare Parts	
11.4.6 Self-Test Mode	32	14.3 List of Spare Parts	51
11.5 Sub-Parameters Flow Diagram	33	15. Dimensions	52
11.5.1 Change of Input Signal	34	15.1 SS3L(linear type)	
11.5.2 Selecting DA / RA		15.2 SS3R(rotary type)	53
		16. Declarations of Conformity and Certificates	



Safety Instructions 1

These safety instructions are intended to prevent hazardous situations and/or equipment damage. These instructions indicate the level of potential hazard with the labels of “**Caution**,” “**Warning**” or “**Danger**.” They are all important notes for safety and must be followed in addition to International Standards (IEC)^{Note 1}, and other safety regulations.

Note 1) IEC 60079-0 : 2007
IEC 60079-1 : 2007



Caution

Caution indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.



Warning

Warning indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.



Danger

Danger indicates a hazard with a high level of risk which, if not avoided, could result in death or serious injury.



Warning

1. The compatibility of the product is the responsibility of the person who designs the equipment or decides its specifications.

Since the product specified here is used under various operating conditions, its compatibility with specific equipment must be decided by the person who designs the equipment or decides its specifications based on necessary analysis and test results. The expected performance and safety assurance of the equipment will be the responsibility of the person who has determined its compatibility with the product. This person should also continuously review all specifications of the product referring to its latest catalogue information, with a view to giving due consideration to any possibility of equipment failure when configuring the equipment.

2. Only personnel with appropriate training should operate machinery and equipment. The product specified here may become unsafe if handled incorrectly.

The assembly, operation and maintenance of machines or equipment including our products must be performed by an operator who is appropriately trained and experienced.

3. Do not service or attempt to remove product and machinery/equipment until safety is confirmed.

1. The inspection and maintenance of machinery/equipment should only be performed after measures to prevent falling or runaway of the driven objects have been confirmed.

2. When the product is to be removed, confirm that the safety measures as mentioned above are implemented and the power from any appropriate source is cut, and read and understand the specific product precautions of all relevant products carefully.

3. Before machinery/equipment is restarted, take measures to prevent unexpected operation and malfunction.

4. Contact POWER-GENEX beforehand and take special consideration of safety measures if the product is to be used in any of the following conditions.

1. Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.

2. Installation on equipment in conjunction with atomic energy, railways, air navigation, space, shipping, vehicles, military, medical treatment, combustion and recreation, or equipment in contact with food and beverages, emergency stop circuits, clutch and brake circuits in press applications, safety equipment or other applications unsuitable for the standard specifications described in the product catalogue.

3. An application which could have negative effects on people, property, or animals requiring special safety analysis.

4. Use in an interlock circuit, which requires the provision of double interlock for possible failure by using a mechanical protective function, and periodical checks to confirm proper operation.

5. Do not open when an explosive gas and dust atmosphere may be present



Safety Instructions 2



Caution

1. The product is provided for use in manufacturing industries.

The product herein described is basically provided for peaceful use in manufacturing industries. If considering using the product in other industries, consult POWER-GENEX beforehand and exchange specifications or a contract if necessary. If anything is unclear, contact your nearest sales branch.

Limited warranty and Disclaimer/Compliance Requirements

The product used is subject to the following “Limited warranty and Disclaimer” and “Compliance Requirements”. Read and accept them before using the product.

Limited warranty and Disclaimer

1. The warranty period of the product is 1 year in service or 1.5 years after the product is delivered. Note 2)

Also, the product may have specified durability, running distance or replacement parts. Please consult your nearest sales branch.

2. For any failure or damage reported within the warranty period which is clearly our responsibility, a replacement product or necessary parts will be provided. This limited warranty applies only to our product independently, and not to any other damage incurred due to the failure of the product.

3. Prior to using POWER-GENEX products, please read and understand the warranty terms and disclaimers noted in the specified catalogue for the particular products.

Note 2) Vacuum pads are excluded from this 1 year warranty.

A vacuum pad is a consumable part, so it is warranted for a year after it is delivered.

Also, even within the warranty period, the wear of a product due to the use of the vacuum pad or failure due to the deterioration of rubber material are not covered by the limited warranty.

Compliance Requirements

1. The use of POWER-GENEX products with production equipment for the manufacture of weapons of mass destruction (WMD) or any other weapon is strictly prohibited.

2. The exports of POWER-GENEX products or technology from one country to another are governed by the relevant security laws and regulations of the countries involved in the transaction. Prior to the shipment of a POWER-GENEX product to another country, assure that all local rules governing that export are known and followed.

Precautions 1

Be sure to read before handling.

Operation



Warning

1. Do not operate the positioner outside the specified range as this may cause problems. (Refer to the specifications.)
2. Design the system to include a safety circuit to avoid the risk of danger should the positioner suffer failure.
3. Be sure that exterior lead-in wiring to the terminal box is based on the guidelines for explosion-protection of manufactory electric equipment when being used as a flame proof, explosion proof construction.
4. Do not remove terminal cover in a hazardous location while the power is on.
5. Covers for the terminal and body should be in place while operating.
6. When using as an intrinsically safe explosion-proof product, do not wire in a hazardous location while the power is on.



Caution

1. Do not touch the actuator or valve's oscillating section when supply pressure has been added, as this is dangerous.
2. Make sure fingers do not get caught when mounting and aligning the cam.
Cut off the pressure supply and always release the compressed air inside the positioner and actuator before performing this work.
3. Always use with the body cover unit mounted.
Moreover, the positioner may not meet degrees of protection IP66 depending on the body cover mounting conditions. In order to meet degrees of protection IP66, tighten threads using the proper tightening torques (2.8 to 3.0 N·m).
4. Always flush the pipe's inside before piping to ensure foreign objects such as machining chips do not enter the positioner.
5. The actuator opening may become unstable when using the booster relay.
6. Always use a ground connection to prevent noise from the input current and to prevent damage because of static electricity.
7. Use the pressure reading on the supplied pressure gauge as an indication.
8. The supplied pressure gauge's needle will malfunction if the pressure supply to the internal mechanism or positioner freezes. Ensure that the pressure gauge's internal parts do not freeze if using the pressure gauge in an operating environment with an ambient temperature of less than 0°C.
9. Electromagnetic compatibility (EMC)
The housing is made of metal in order to increase the electromagnetic compatibility in case of high frequency radiation. Note that this protection can only become effective if you connect the ground connection of the housing to grounded valves using a short, sufficiently-thick electrical cable. The ground connection is also used for connection to potential equalizing bars. Conductor cross-sections of up to 4mm² can be connected. To avoid device malfunctions, it should only be operated in a controlled electromagnetic environment. This means that radio transmitting devices, such as cellular phones must not be used in the direct vicinity.

For users



Caution

1. Assemble, operate and maintain the positioners after reading the operation manual thoroughly and understanding the content.

Precautions 2

Be sure to read before handling.

Handling



Caution

1. Avoid excessive vibration or impact to the positioner body and any excessive force to the armature, as these actions may cause damage to the product. Handle carefully while transporting and operating.
2. If being used in a place where vibration occurs, using a binding band is recommended to prevent broken wires because of the vibration.
3. When exposed to possible moisture invasion, please take the necessary measures. For example, if the positioner is left onsite for long periods, a plug should be put in the piping port and a body cover unit fitted to avoid water penetration.
Take measures to avoid dew condensation inside the positioner if exposed to high temperature and humidity. Take enough measures against condensation especially when packing for export.
4. Keep magnetic field off the positioner, as this affects its characteristics.

Air Supply



Caution

1. Use only dehumidified and dust extracted clean compressed air as the air supply.
2. Use only dehumidified and dust extracted clean compressed clean air as the positioner contains extrafine orifices such as restrictor and nozzle.
Do not use a lubricator.
3. Do not use compressed air containing chemicals, organic solvents, salinity or corrosive gases, as this may cause malfunction.
4. When operating below the freezing point, protect the positioner from freezing.

Operating Environment



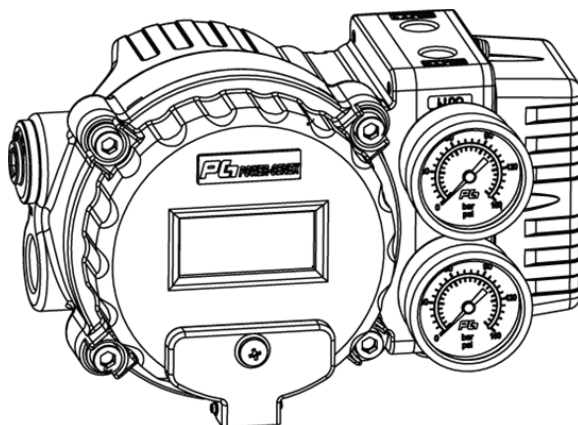
Caution

1. Do not operate in locations with an atmosphere of corrosive gases, chemicals, sea water, or where these substances will adhere to the regulator.
2. Do not operate out of the indicated operation temperature range as this may cause damage to electronic parts and seal materials to deteriorate.
3. Do not operate in locations where excessive vibration or impact occurs.
4. If the body cover is being installed in a place where the body cover is exposed to direct sunlight, the use of a standard body cover without the LCD window is recommended.

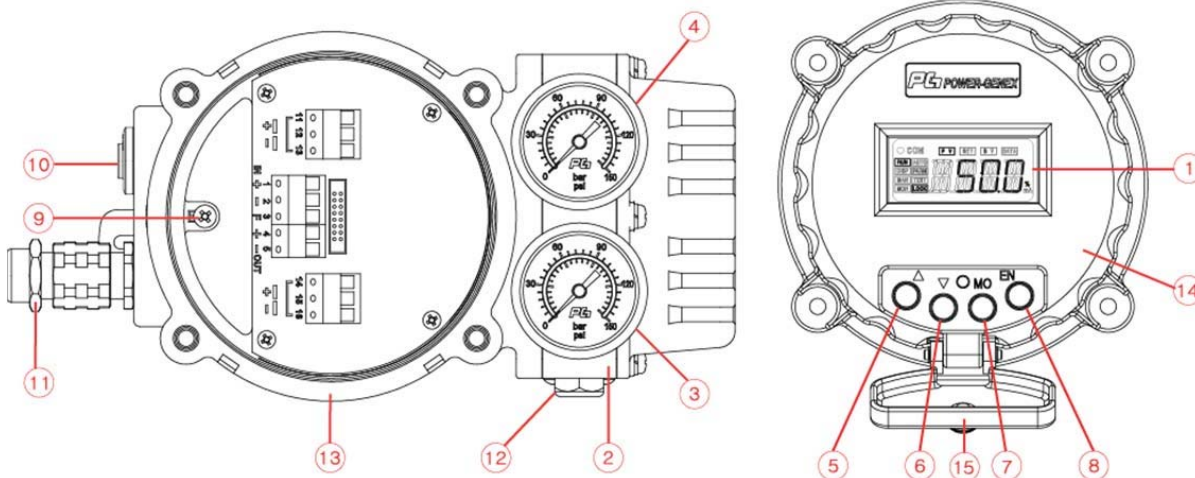
2. Overview of Structure

This product consists of the following parts.

- Electronic card comprised of microprocessor, HART modem and LCD
- Potentiometer for position feedback
- Pilot valve, Torque motor, Pressure gauge, Air line block



The followings are descriptions of internal parts without cover.



1	LCD	7	MO, Mode button	13	Positioner body
2	Gauge block	8	ENT, button	14	Positioner cover
3	Supply air gauge	9	Ground	15	Button cover
4	Out 1 gauge	10	Blind plug (or cable gland)		
5	▲ UP, Up button	11	Cable gland (or Blind plug)		
6	▼ DN, Down button	12	Air venting hole		

3. Specifications

Input signal	4 - 20 mA @ 24 VDC
Min. / Max. current	3.6 mA / 50mA
Voltage drop (impedance)	Without HART : 8.7 VDC (435Ω @ 20mA) With HART : 9.4 VDC (470Ω @ 20mA)
Operating angle/ stroke	Linear type: 8 - 130mm * Rotary type: 25 - 120°
Supply air pressure	1.4 - 7.0 bar (20 - 100 psi)
Output pressure range	0 - 100% of supply air
Air flow capacity	80 ℓ /min = 4.8 Nm³/h = 2.8 scfm (Sup = 1.4 bar) 233 ℓ /min = 14 Nm³/h = 8.2 scfm (Sup = 6 bar)
Air consumption	2.8 ℓ /min = 0.17 Nm³/h = 0.1 scfm (Sup = 1.4 ~ 6 bar)
Operating characteristic	Linearity < ±0.3% F.S Sensitivity < 0.2% F.S Hysteresis < 0.2% F.S Repeatability < 0.2% F.S
LCD display	4-digit
Response speed	1 - 1000 (Min. 1, Max. 1000)
Scan time	2 ms
Shut-off value	0 - 10%
Valve action	Direct acting (DA) / reverse acting (RA)
Operating temperature	-30 ~ +75°C (-22 ~ +167°F)
Pneumatic connections	Rc 1/4 or NPT 1/4
Electrical connections	G 1/2, NPT 1/2 or M20 x 1.5
Explosion proof / protection class	Flameproof (Ex d IIC T6) / IP66
Body material / painting	Aluminum diecast / powder coating
Weight	2.8 kg

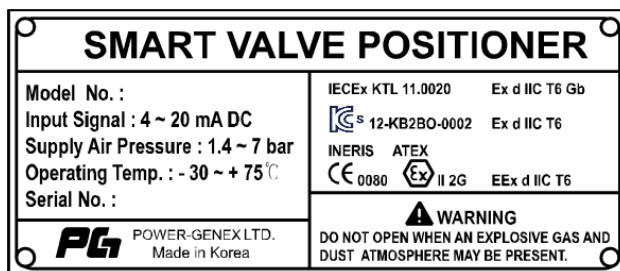
* For more than 200mm stroke on request

4. Part Numbering System (order code)

Model classification code or ordering information or type designation or model schedule or model numbering system

		SS3	x	—	x	x	x	x	x	x	x	x	x
Actuator action	Linear type	L											
	Rotary type	R											
Protection class	Flameproof (Ex d IIC T6)	F											
Feedback lever	Linear type	8 ~ 30mm stroke	A										
		8 ~ 70mm stroke	B										
		8 ~ 130mm stroke	C										
		80 ~ 200mm stroke	D										
	Rotary type	Fork lever	F										
		NAMUR shaft (direct mounting)	N										
Pressure Gauge	Not included		0										
	6 bar (90psi)		1										
	10 bar (150psi)		2										
Position feedback	Not included						N						
	Position transmitter (4~20mA output)						O						
	2 x alarm limit						L						
	2 x micro switch (SPDT)						S						
	O + L						M						
	O + S						Q						
Communication	Not included						N						
	HART communication						H						
	Profibus communication						P						
Pneumatic – electrical connections	Rc 1/4 - G 1/2 (standard)							3					
	NPT 1/4 - NPT 1/2							4					
	Rc1/4 - M20x1.5							5					
Mounting bracket	Not included									N			
	IEC 60534-6-1 (for SS3L)									L			
	IEC 60534-6-2(VDI/VDE 3845)(for SS3R)									R			
Feedback pin guide	Not included											0	
	Included											1	

4.1 Marking



MODEL NUMBER

Model number and options are described.

INPUT SIGNAL

Current input signal is described. 4~20mA current is used. Inquire the head office or the agents if other special input signal is required.

Supply Air Pressure : 1.4 ~ 7bar(20 ~ 101psi)

SERIAL NUMBER / DATE : A serial number and a manufacturing date for tracking are described.

Certificate No

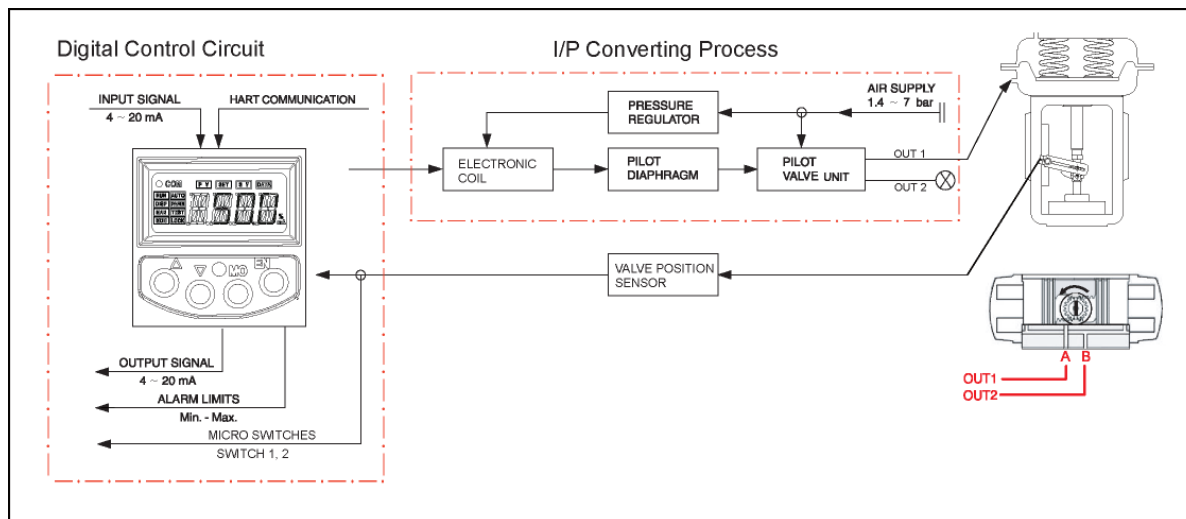
CE XXXX / INERIS ATEX XXXX / IECEX KTL 11.0020X / 11-KB2BO-XXXX

Code : Ex d IIC T6 Gb (Tamb. -30 to +75°C)

WARNING

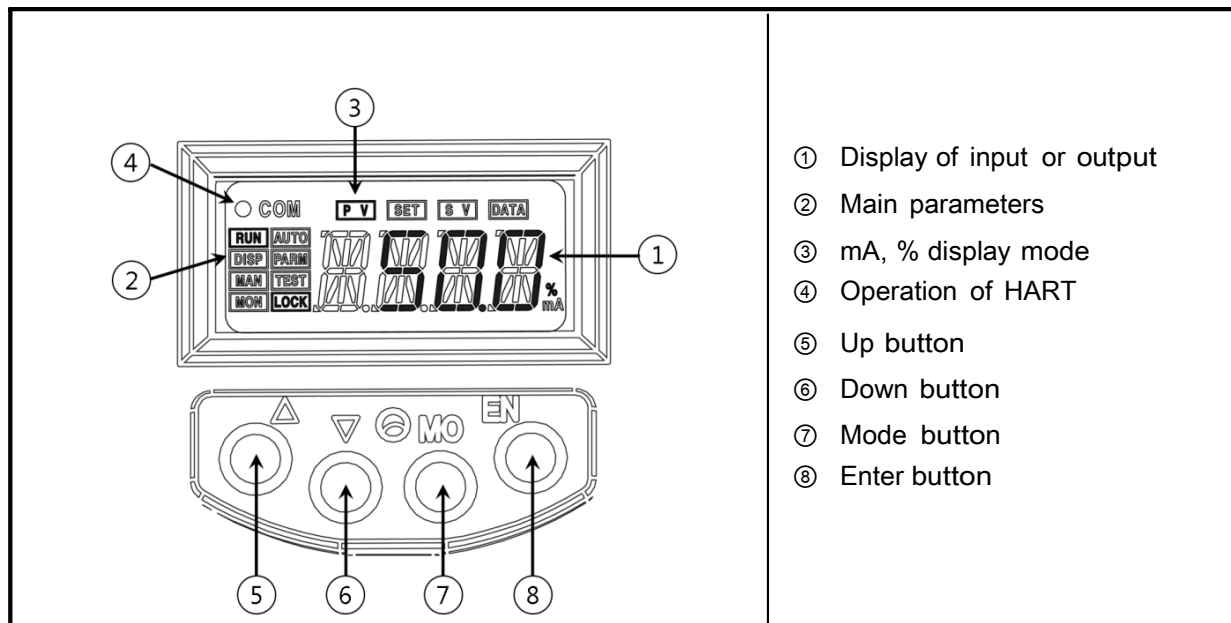
1. Potential electrostatic charging hazard
2. Do not open when an explosive gas and dust atmosphere may be present
3. See instruction

5. Principle of Operation



If 4-20 mA input signal is supplied, the micro processor compares input signal with position feedback and sends control signal to the I/P converting module. Pneumatic signal from the I/P converting module operates the valve and the valve stays at the desired position.

6. Descriptions of LCD display and Buttons



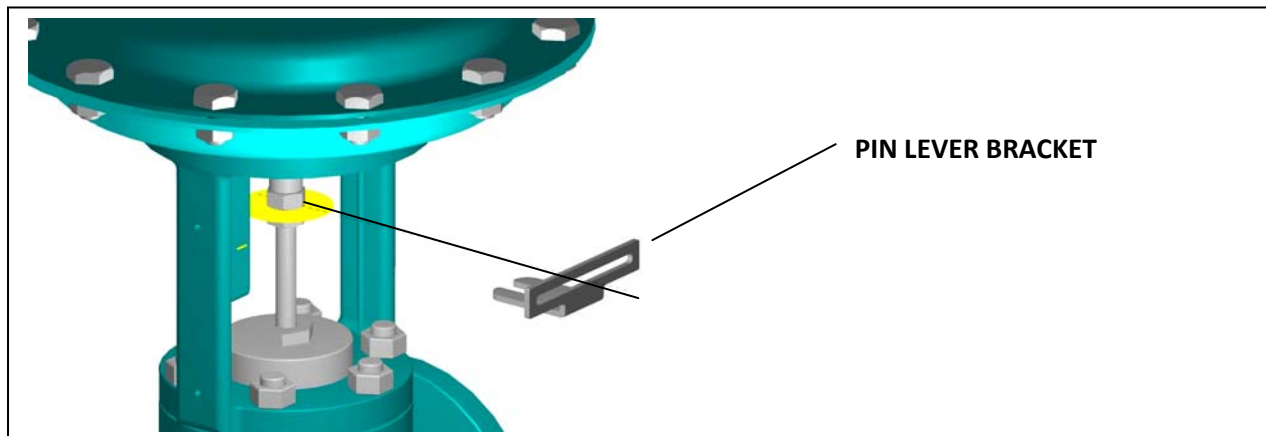
Press "Mode" button for 5 seconds	• Quick auto-calibration
Press "Up(▲)" button for 5 seconds	• P-gain adjustment
Press "Down(▼)" button for 5 seconds	• Span adjustment
Press "Enter" button	• Ambient temperature (°C)

① Display of input or output	· mA, %
② Main parameters	MODE ↔ RUN ↔ DISP ↔ MAN ↔ MON ↔ ↑ ↓ AUTO LOCK ↔ TEST ↔ PARM
③ Display mode	· Selection of mA, % or in reverse way with values shown (Ex. Reverse : 20% shown → 80% shown)
④ HART communication	· HART communication
⑤ Up (▲)	· UP button
⑥ Down (▼)	· DOWN button
⑦ MO (Mode)	· Selection of running mode · Selection of parameter group or parameter
⑧ EN(Enter)	· Save of setting values

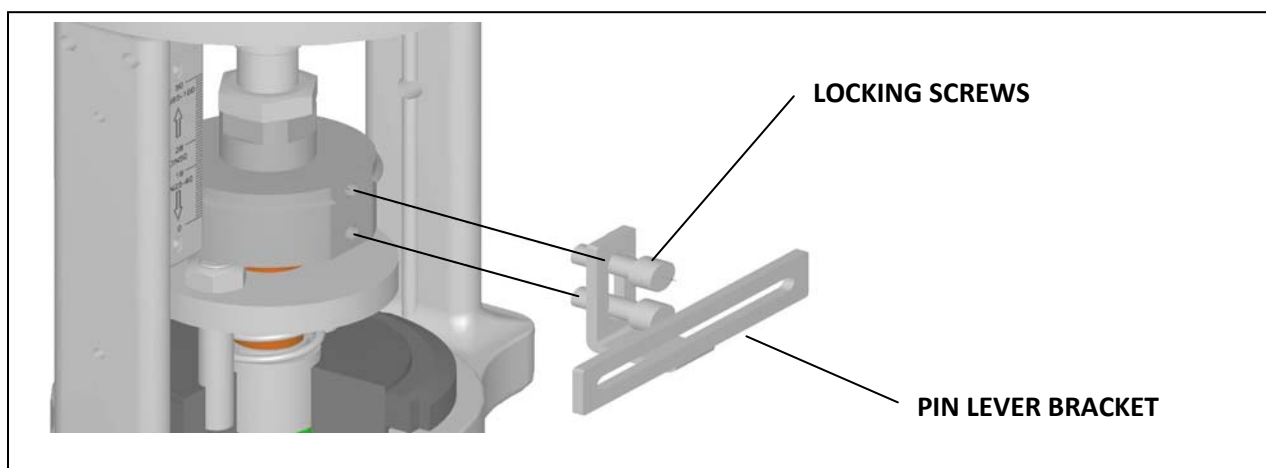
7. Installation

7.1 Mounting onto Linear Actuator

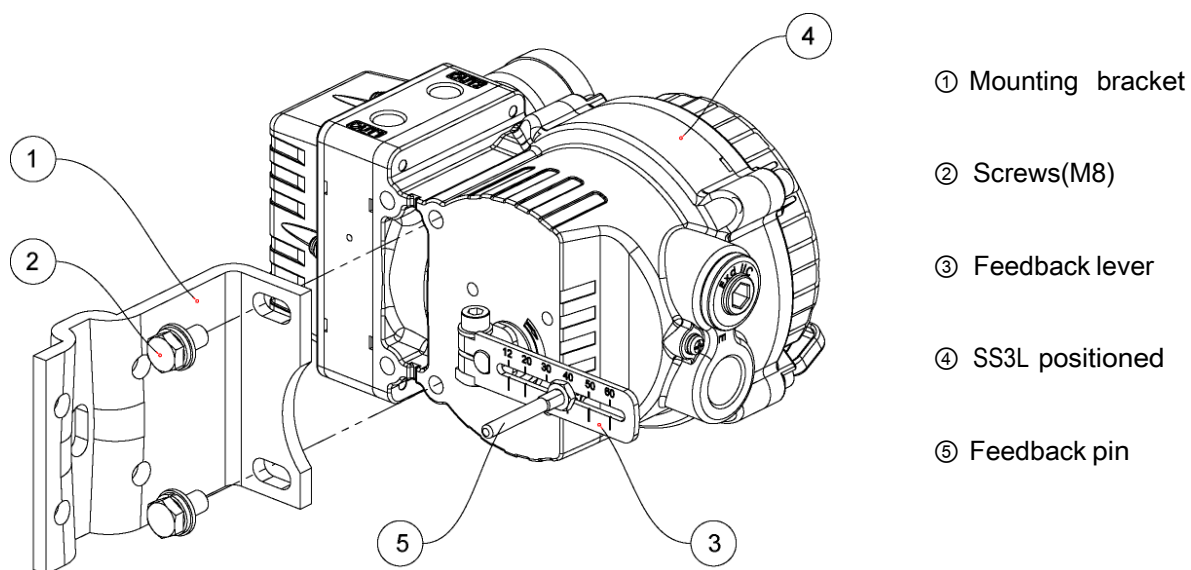
7.1.1 Installation on UNIWORLD and HYGIENIC Series



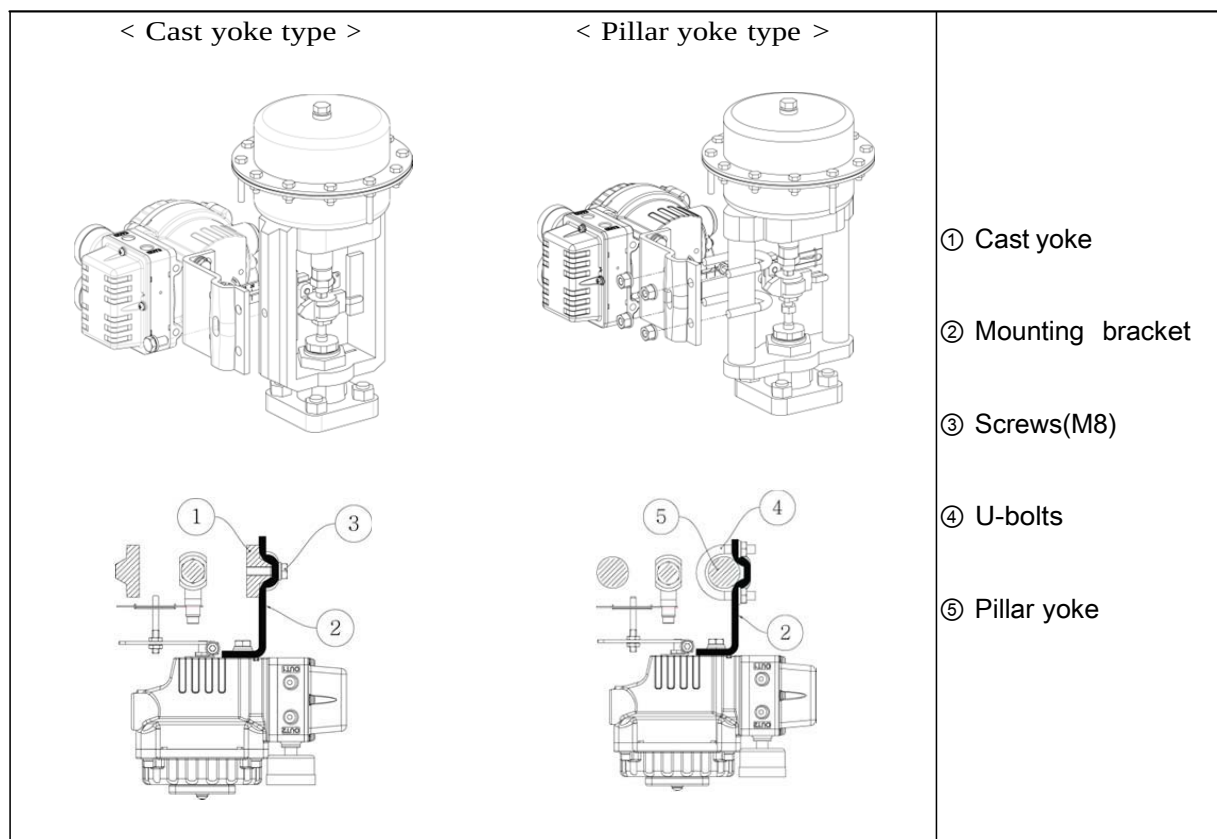
7.1.1 Installation on HP60 Series



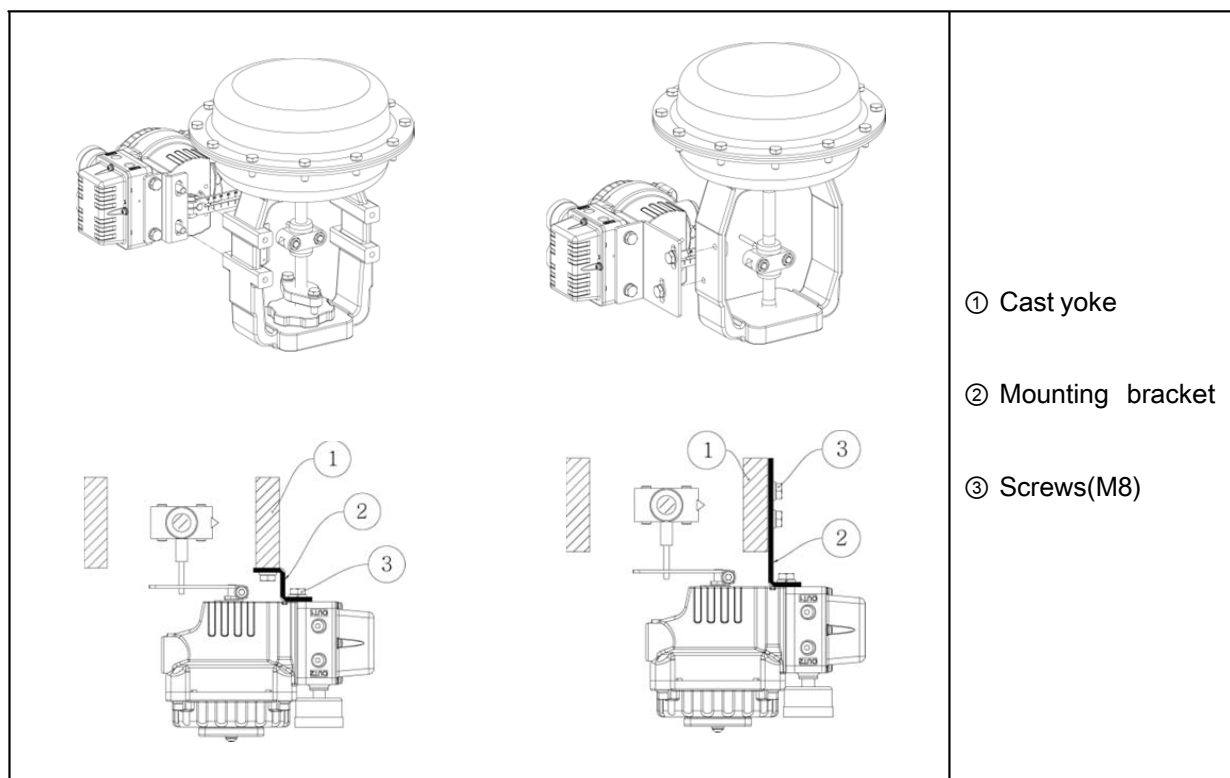
Mounting bracket for SS3L positioned is designed to support IEC 60534-6-1.



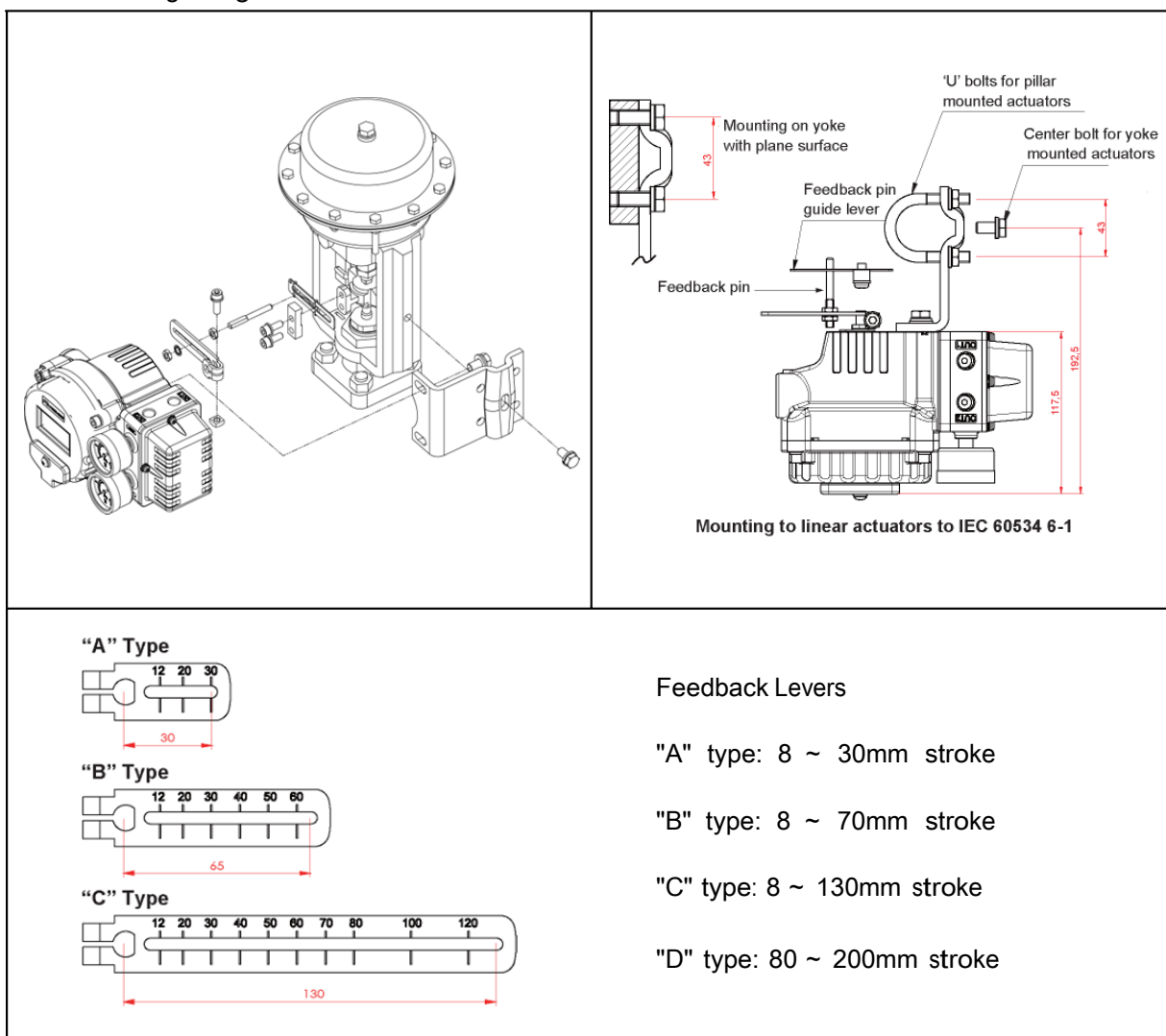
7.1.3 Mounting onto Cast Yoke or Pillar Yoke



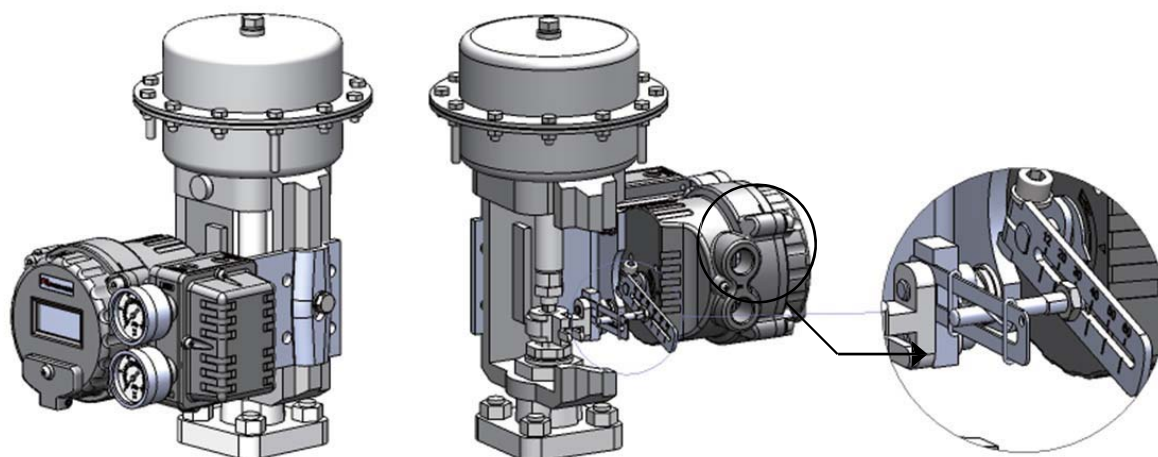
7.1.4 Mounting onto Other Kind of Cast Yoke



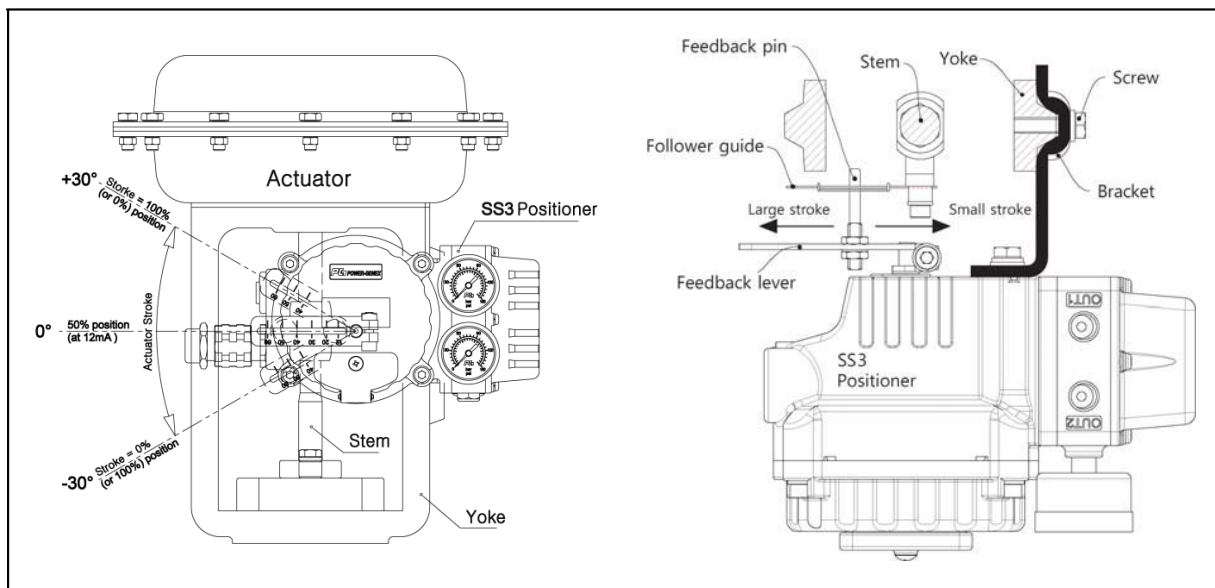
7.1.5. Mounting Diagram



7.1.6 Installation of Feedback Pin Follower Guide



7.1.7 Standard Installation



- ① Supply air directly to the actuator, adjust the air filter regulator and set air when the valve reaches to 50% stroke.

- ② Install the feedback pin at around 30% higher point of the stroke indicated on the feedback lever than the required stroke of the control valve and fix with a screw tightly. For example,

Control valve stroke	Stroke indicated on feedback lever
15mm	20mm
20mm	25mm
30mm	40mm

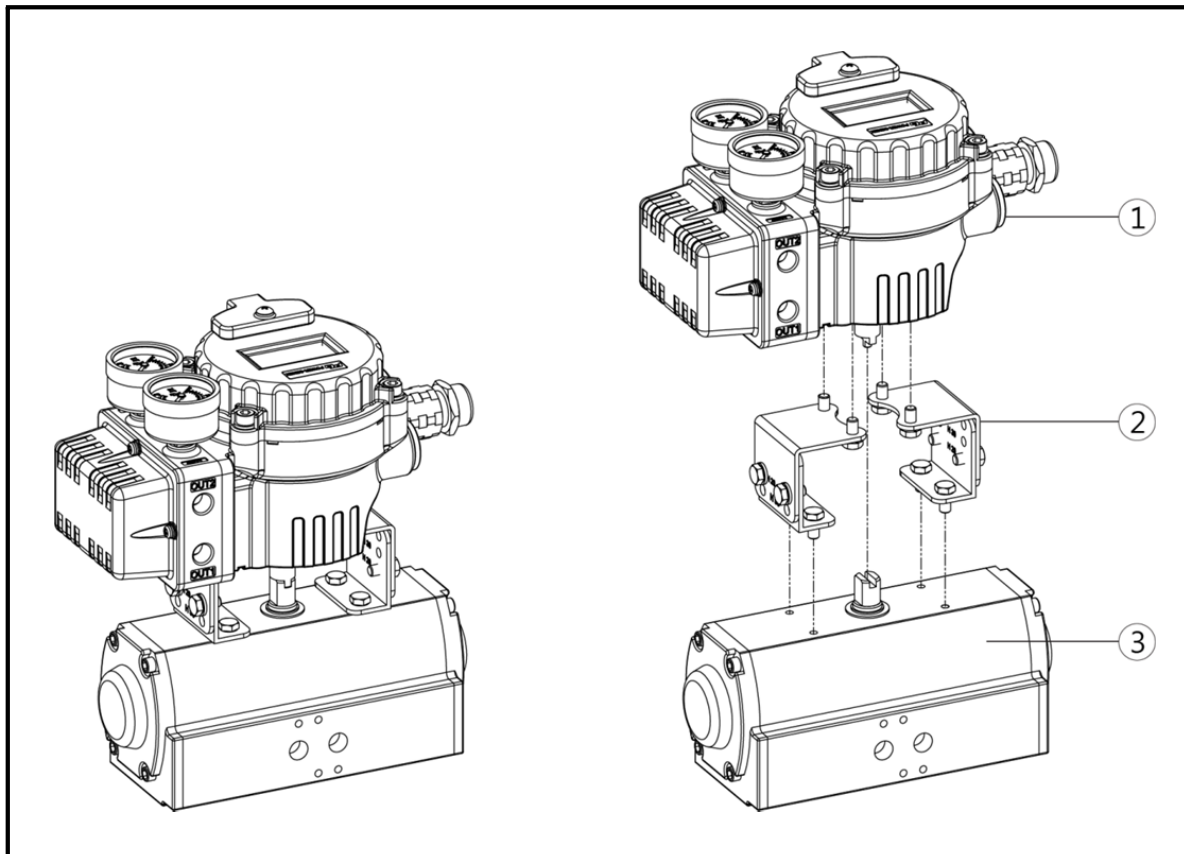
- ③ Install the feedback lever horizontally at 50% stroke position.
- ④ If the feedback lever is not installed horizontally, move the mounting bracket up and down little by little so that it can be positioned horizontally.
- ⑤ Fix the mounting bracket with screws(M8).
- ⑥ Connect air lines between the position and the actuator and supply air to the positioned and perform auto-calibration by pushing Mode button for 5 seconds.
- ⑦ The operating angle from 0% to 100% stroke should be within the range of 30°. In case of the over-range of 30°, move the valve stem pin left and right and make the operating angle stay within 30°.



Be sure to install the air filter regulator before the positioned and check a supply air pressure required to move the valve.

7.2 Mounting onto Rotary Actuator

7.2.1 The SS3R positioned supports NAMUR mounting standard (VDI/VDE 3835, IEC 60534-6-2).



① SS3R positioner

② Multi-size bracket

③ Rotary actuator

Ⓐ Assemble the multi-size bracket to the positioner with 4 pcs M6 screw.

Ⓑ Mount the positioned onto the actuator with 4 pcs M5 screw.

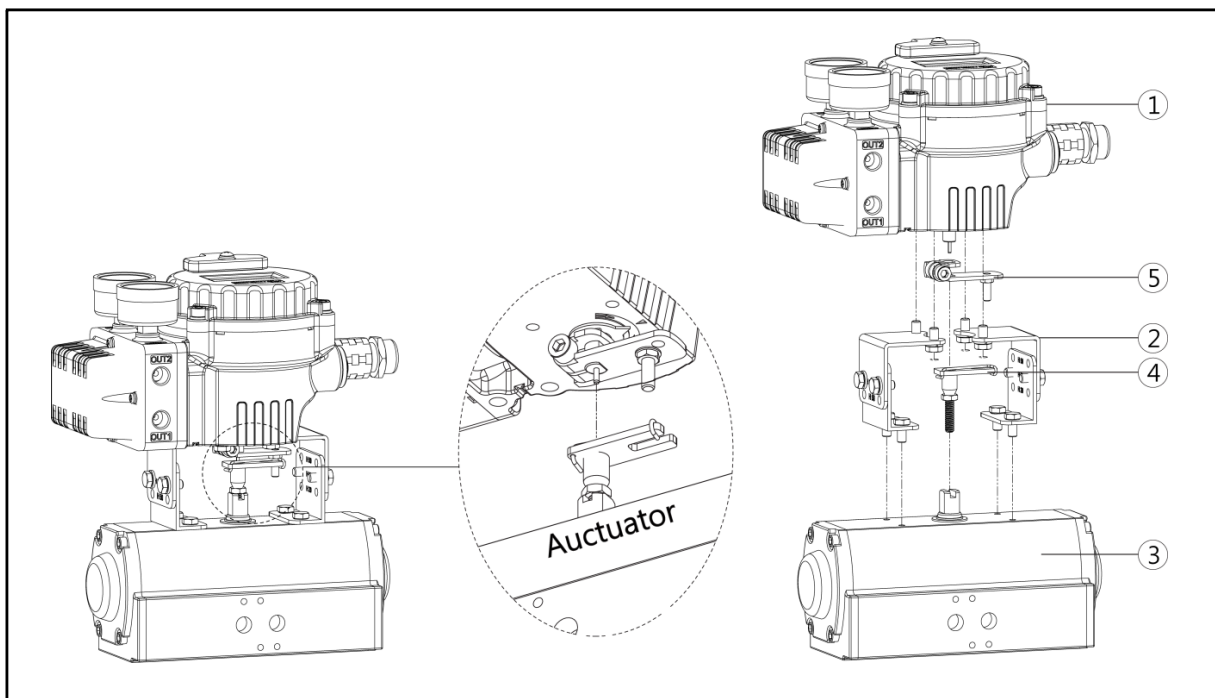
Ⓒ Connect air lines between the positioned and the actuator.

Ⓓ Perform auto-calibration by pushing MODE button for 5 seconds.



Be sure to install the air filter regulator before the positioned and check a supply air pressure required to move the valve.

7.2.2 Mounting with Fork Lever Type



① SS3R positioner

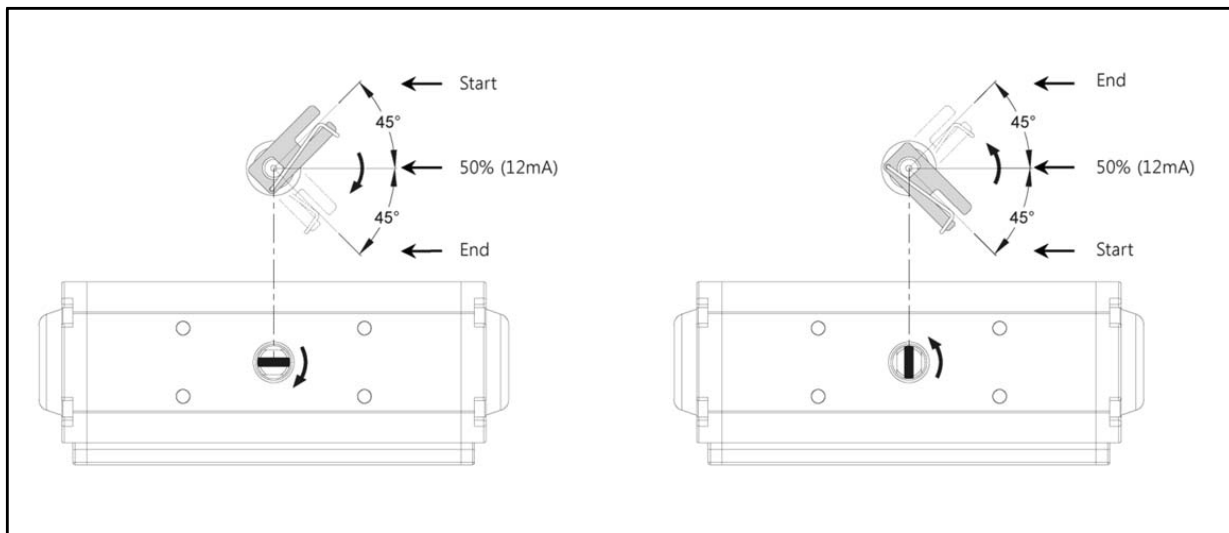
② Multi-size bracket

③ Rotary actuator

④ Fork lever

⑤ Positioner feedback lever

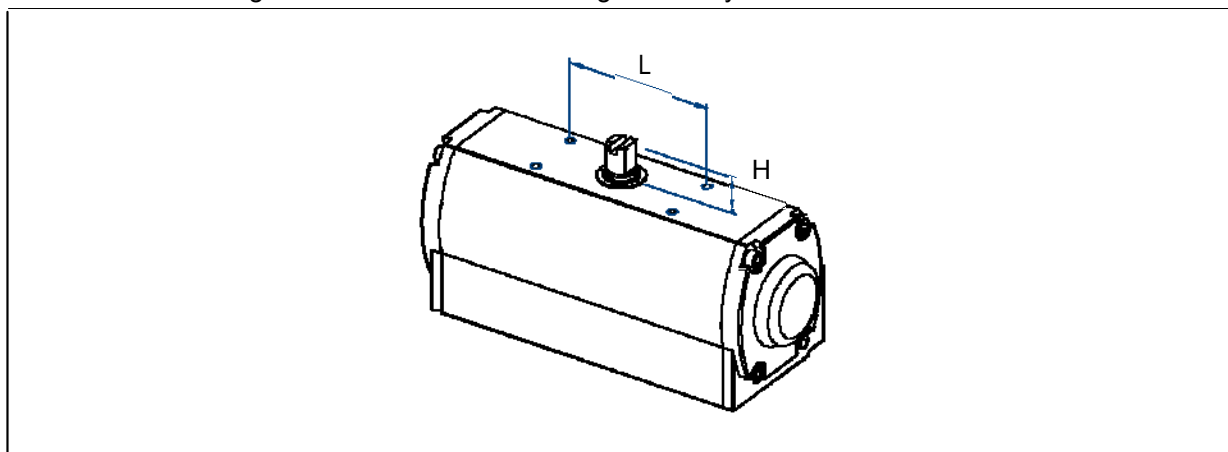
7.2.3 Position of Fork Lever



Clockwise movement

Counter-clockwise Movement

7.2.4 Re-assembling Multi-size Bracket according to Rotary Actuator



L (mm)	H (mm)	
80	20	
80	30	
80	50	

L (mm)	H (mm)	
130	20	
130	30	
130	50	



Check L and H on the actuator and re-assemble the multi-size bracket to fit your actuator mounting configuration.

8. Air Connections



- ① Be sure to install the air filter regulator before the positioner.
- ② Supply air should not contain water, oil or moisture.
- ③ It is recommended to set a supply air pressure 10% higher than the actual operating pressure of the actuator.

8.1 SS3L (linear type)

Direct Acting (DA)		Reverse Acting (RA)	
DA 1 As the input signal increases, Valve stem moves downwards Actuator : DA	OUT2 must be plugged	RA 1 As the input signal increases, Valve stem moves upwards Actuator : RA	OUT2 must be plugged
DA 2 As the input signal increases, Valve stem moves downwards Actuator : DA	OUT1 must be plugged	RA 2 As the input signal increases, Valve stem moves upwards Actuator : RA	OUT1 must be plugged
DA 3 As the input signal increases, Valve stem moves downwards		RA 3 As the input signal increases, Valve stem moves upwards	

8.2 SS3R (rotary type)

Spring Return	Double Acting	Double Acting
OUT2 must be plugged		
As the input signal increases, Actuator shaft rotates counter-clockwise	As the input signal increases, Actuator shaft rotates counter-clockwise	As the input signal increases, Actuator shaft rotates clockwise

	Spring Return	Double Acting
Reverse Acting	Out 1 : piped, Out2 : plugged	Out1 : piped to Actuator port A, Out2 : piped to Actuator port B
Direct Acting	Out 1 : plugged, Out2 : piped	Out 1 : piped to Actuator port B, Out2 : piped to Actuator port A

9. Electrical Connections



- ① Be sure to supply the rated voltage and current stated on this manual. Otherwise, it may cause a serious damage or malfunctions.
- ② Check polarity of + and - exactly and connect wires.
- ③ When it is necessary to open the positioner cover at a humid place, more attention is required. It may cause a serious damage or malfunctions.

IECEx explosion-proof construction

The Smart positioner SS3 becomes explosion proof, as certified by IECEx, according to the model selected.

The explosion-proof grade has the following approval : Ex d IIC T6.

Take extra care when handling the positioner as explosion-proof equipment

To use as Ex d IIC T6

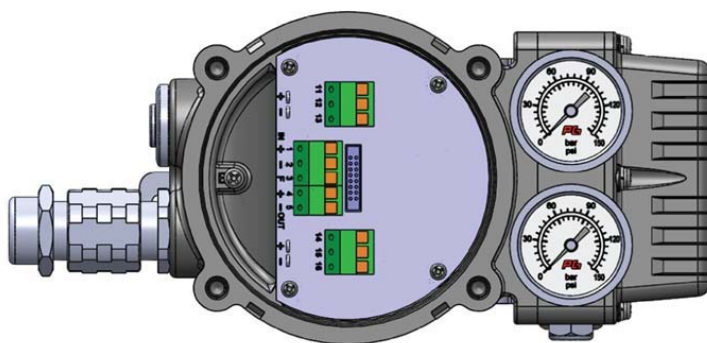
A) Pressure-proof packing.

As shown below in the chart, use "Cable gland"

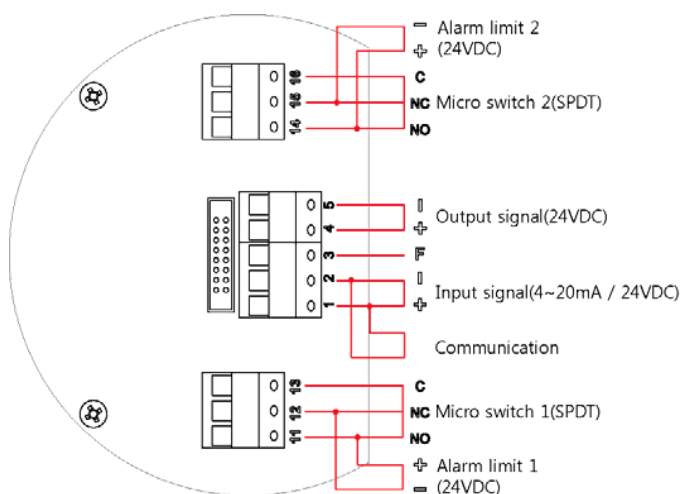
B) Metal Piping.

Attach the sealant fitting bracket near the cable port.

(For details, refer to "The guideline on electric equipment explosion proof" published by the Technology Institution of Industrial Safety).



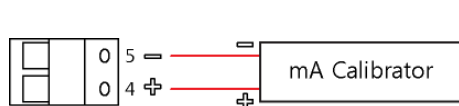
9.1 Terminal Block



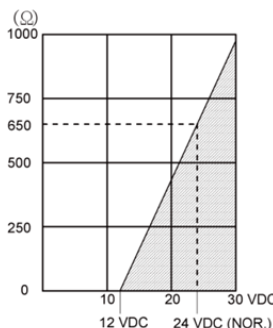
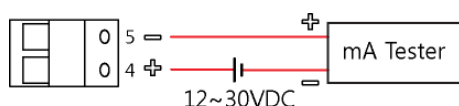
1	+ 4-20mA Input signal
2	- 4-20mA Input
3	Ground
4	+ 4-20mA Output signal
5	- 4-20mA Output signal
11	+ Alarm limit 1
12	- Alarm limit 1
14	+ Alarm limit 2
15	- Alarm limit 2
11	Micro switch 1 NO
12	Micro switch 1 NC
13	Micro switch 1 COM
14	Micro switch 2 NO
15	Micro switch 2 NC
16	Micro switch 2 COM

9.2 Measuring Output Signal

9.2.1 With mA loop calibrator



9.2.2 With multi-meter



Transmitter Load Limitation

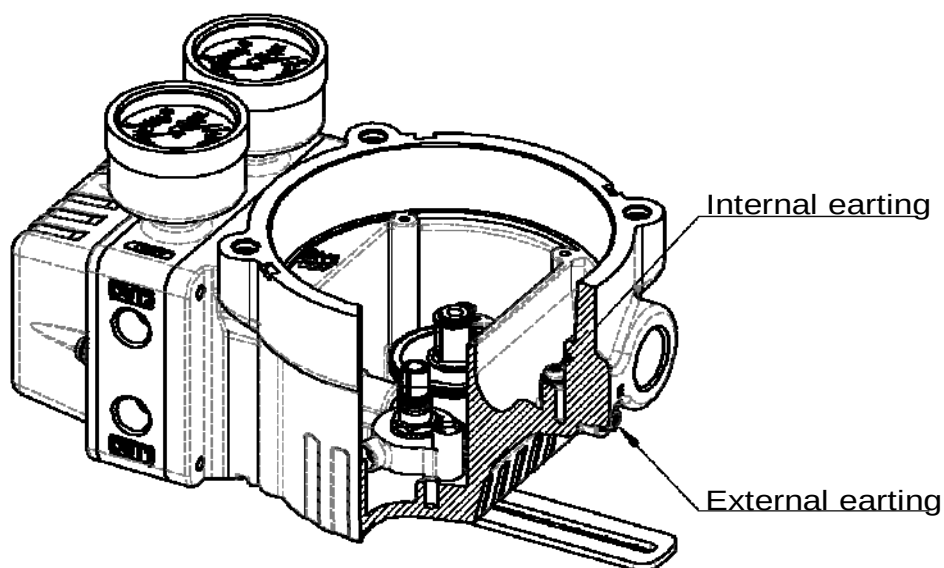
Position Transmitter Specifications	
Output signal	4 – 20mA, 2-wire
Power supply	12 – 30 VDC
Output current limit	30mA DC
Linearity	±0.75% F.S
Operating temperature	-20 ~ +80°C



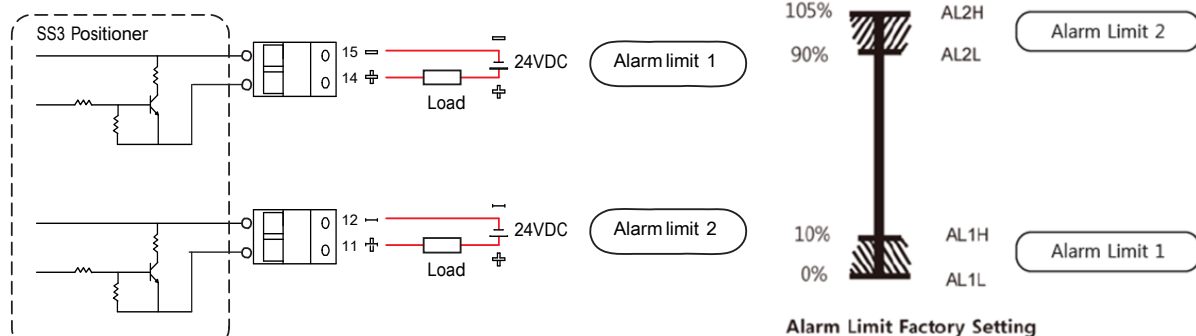
Zero and span of position feedback (4-20mA output signal) are set automatically during auto-calibration process.

9.3 Earthing

The Positioner must be connected to a good quality earth. The units are provided with internal and external earthing terminals which are both located on the terminal chamber section of the unit

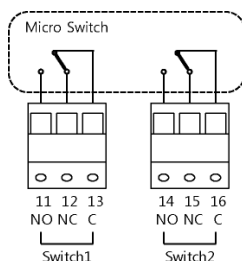


9.4 Wiring Alarm Limits



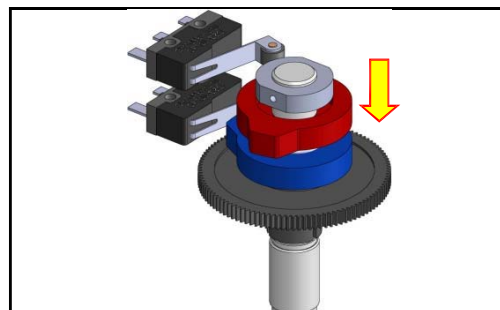
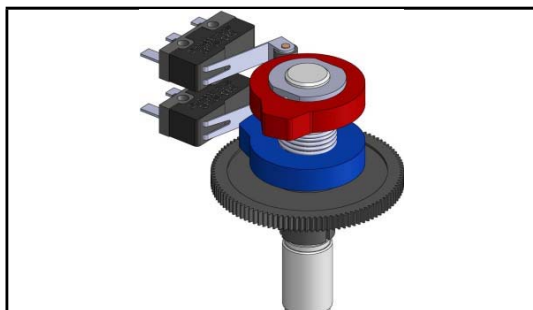
24VDC should be supplied for alarm limits.

9.5 Wiring SPDT and Setting Micro Switches

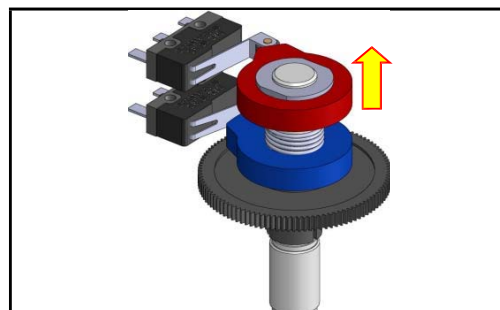
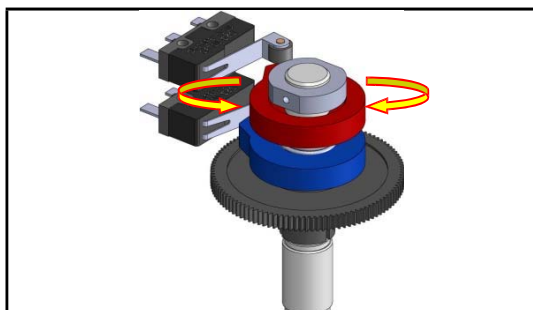


Micro Switch Specifications	
Type	SPDT
Rating code	10.1A @ 250 VAC
Operating temperature	-25 ~ +85°C

< Remove terminal board >



a) Push down the red cam if it is necessary to set the position of the red cam.



b) Turn the red cam until it touches the limit switch. And pick up

c) Do the same procedure for setting of the blue cam. But pick up to move.

For reference, upper switch 1: No. 11, 12, 13

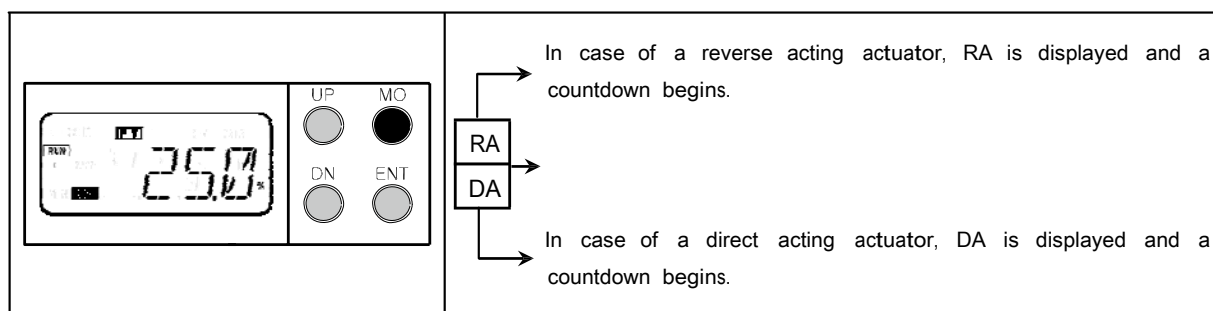
lower switch 2: No. 14, 15, 16

10. Quick Auto-Calibration

10.1 Quick Auto-Calibration

Supply 4-20mA input signal and push MODE button for 5 seconds, auto-calibration process will start.

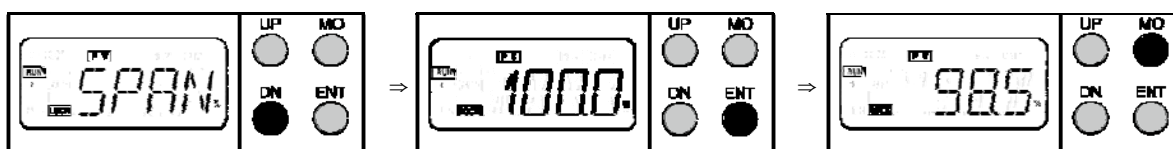
- ① It may take a longer time according to sizes of the control valve and the actuator. Generally, it will take 2 – 3 minutes with the standard size valve and actuator.
- ② If “ DATA” on LCD blinks after auto-calibration process, see the error codes on page 21.



If MONT is shown during step 4 and an auto-calibration process is finished without completion, it means that the current mounting angle is out of the range. Please install the positioner properly. (See 7.1.7 Standard Installation on page 12)

10.2 Span Adjustment (SPAN)

Span is set automatically after auto-calibration process. But it can be re-set manually as below, if necessary.



Push DN button for 5 seconds, SPAN will appear.

Push ENT button, 100 will blink. Push UP or DN button, change the current value and push ENT button for a memory saving.

If SPAN reaches a desired point, push MODE button. RUN mode will start.

The above is just an example to help understand how to set Span to 98.5%.



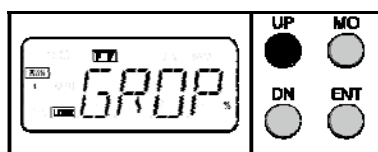
Keep pushing UP/DN button, SPAN will increase or decrease fast. 0.1% will increase or decrease by pushing a button one time.

10.3 P-Gain Adjustment (P-GN)

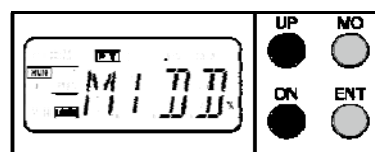


Select LOW, MIDD or HIGH in GROP-Gain after selecting NORM, SMAL, or HARD in Control Mode.

If a hunting or an oscillation happens after auto-calibration, select a control mode (NORM, SMAL, or HARD) proper for a valve working condition and perform auto-calibration again. Change to HIGH from MIDD in GROP in case of a hunting problem. Change to LOW from MIDD in case of an oscillation problem. If a hunting or an oscillation still continues to happen, select other control mode and set in GROP again.



⇒

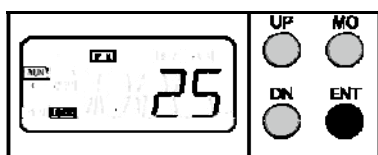


Keep pushing UP button for 5 seconds, GROP will appear.
Push ENT.

Select HIGH or LOW by pushing UP or DN button.

Parameter	Status	Description
		Standard parameter
	Hunting is happening	Change to Hard mode in case of a hunting problem (by rapid under or overshooting)
	Oscillation is happening	Change to Low mode in case of an oscillation problem (by slow under or overshooting)

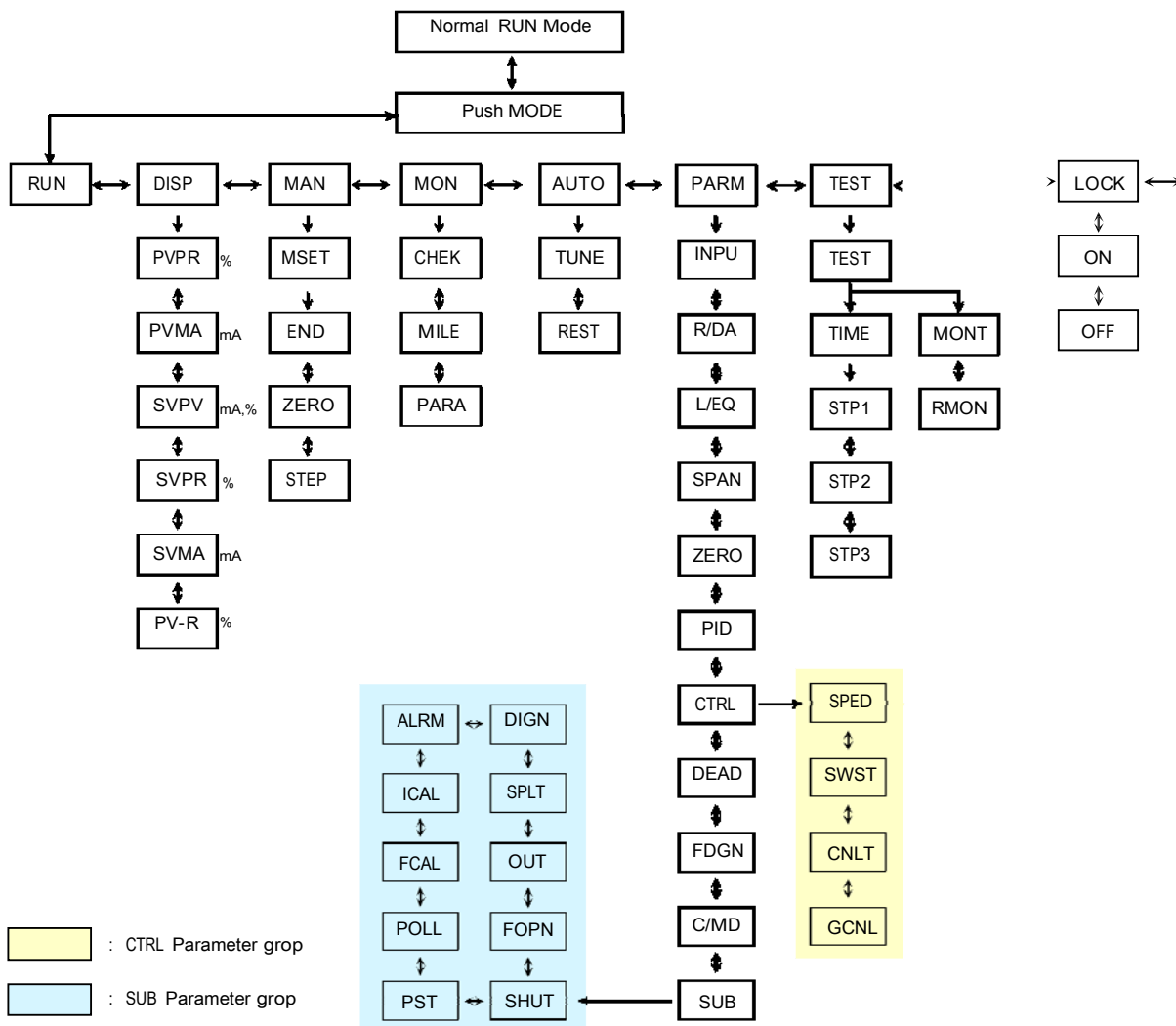
10.4 Checking Ambient Temperature



Keep pushing ENTER button, an ambient temperature surrounding the positioned will appear. Note that this ambient temperature appears only while pushing ENTER button.

11. Description of Parameters Flow

11.1 Parameters Flow Diagram



11.2 Main Parameters

Ref.	Parameter	Description	Function
11.4.2 (P. 28)	DISP	DISPLAY	changes the LCD display mode
	PVPR	PV % value	shows the current position by %
	PVMA	PV mA value	shows the current position by mA
	SVPV	PVPR-SVPR (automatic turn)	shows the current position by % and mA by turns at intervals of 1 second
	SVPR	Input signal % value	shows the input signal by %
	SVMA	Input signal mA value	shows the input signal by mA
	PV-R	PV % value (reversed value)	shows the current position by % in a reverse way (Ex. PVPR – 10% → PV-R – 90%

Ref.	Parameter	Description	Function
11.4.3 (P. 29)	MAN	MANUAL	operates the valve manually
	MSET	MANUAL-SET	operates the valve manually
	END	Move to 100%	moves a valve to 100% regardless of input signals
	ZERO	Move to 0%	moves a valve to 0% regardless of input signals
	STEP	Move by 1%	moves a valve by 1% regardless of input signals

Ref.	Parameter	Description	Function
11.4.4 (P. 30)	MON	MONITOR	checks the current status of the positioner
	CHEK	ERROR CHEK	checks the errors occurred to the positioner
	MILE	Runtime	checks the total valve runtime
	PARA	Registry memory values	checks the registry records in memory

Ref.	Parameter	Description	Function
11.4.5 (P. 31)	AUTO	AUTO-SET	performs auto-calibration and return to the factory settings
	TUNE	Auto-calibration	performs auto-calibration
	REST	RESET	returns to the factory settings

Ref.	Parameter	Description	Function
11.5	PARM	Sub-parameters	see the parameters on next page

Ref.	Parameter	Description	Function
11.4.6 (P. 32)	TEST	TEST MODE	tests the positioner
	TIME	Interval time	sets the testing interval time
	STP1	STEP1	0% → 50% → 100% → 50% → 0% → Repeat
	STP2	STEP2	0% → 25% → 50% → 75% → 100% → 75%
	STP3	STEP3	1% → 10% → 20% ... 90% → 100%

11.3 Parameters

11.3.1 Main Parameters

Ref.	Parameter	Description	Function	Default
11.5.1 (P. 34)	INPU	Input signal	4...20mA or 20...4mA	4...20mA
11.5.2 (P. 34)	R / DA	RA / DA	Reverse acting or direct acting	RA
11.5.3 (P. 34)	L / E.Q / QOPN/USER	Characteristic	Linear, E.Q. % (1:25 or 1:50), Quick open or User set (17points)	Linear
11.5.4 (P. 36)	SPAN	Span adjustment	0...100%	100%
11.5.5 (P. 36)	ZERO	Zero adjustment	0...99%	0%
11.5.6 (P. 37)	PID	P-GN / I-GN / D-GN	Proportional / Integral / Differential gain value	Auto-set
11.5.7 (P. 39)	CTRL	SPED / SWST / CNLT / GCNL	See 11.3.2 CTRL	.
11.5.8 (P. 40)	DEAD	Dead band	0...9.99%	0.5%
11.5.9 (P. 41)	FDGN	D-gain setting for hard mode	D-Gain setting for hard mode	Auto-set
11.5.10 (P. 41)	C/MD	NORM / HARD / SMAL	Standard actuator, strong valve packing friction, small actuator or angle seat valve	NORM
11.5.11 (P. 42)	SUB	Sub-Parameters	See 11.3.3 SUB	.

11.3.2 CTRL - Parameters (control speed adjustment)

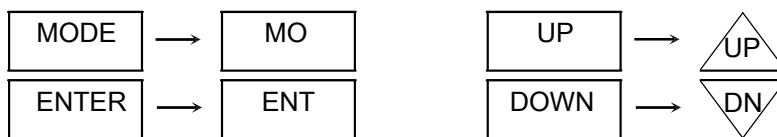
Ref.	Parameter	Description	Function	Default
11.5.7.A (P. 39)	SPED	Response speed	1...1000	1000
11.5.7.B (P. 39)	SWST	Slow start	Smooth operation	Auto-set
11.5.7.C (P. 40)	CNLT	Control limit	50...1250	Auto-set
11.5.7.D (P. 40)	GCNL	Gap Control limit	100...650	Auto-set

11.3.3 SUB - Parameter

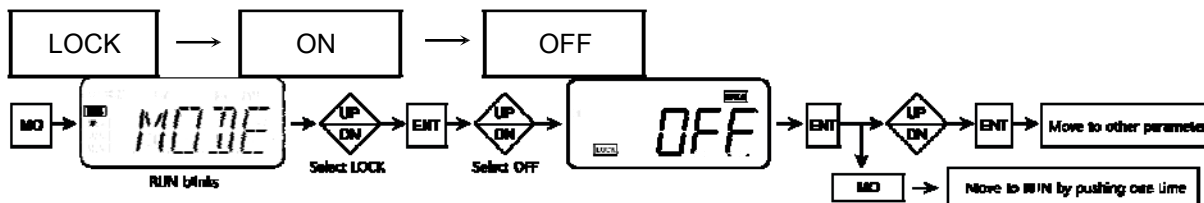
Ref.	Parameter	Description	Function	Default
11.5.11.A (P. 42)	SHUT	Shut-off	0...9.9%	0.3%
11.5.11.B (P. 43)	FOPN	Full-open	0...9.9%	0.3%
11.5.11.C (P. 43)	OUT	Output signal	4...20mA or 20...4mA	4...20mA
11.5.11.D (P. 43)	SPLT	Split range	4...12mA or 12...20mA	4...20mA
11.5.11.E (P. 43)	DIGN	Display place	Movement to one or two decimal places	1
11.5.11.F (P. 44)	ALAM	Alarm limit low, high	AL1L/AL1H, AL2L/AL2H	0...10%, 90...105%
11.5.11.G (P. 46)	ICAL	IN4M / IN20	sets the values in accordance with 4~20mA input signals	Factory setting
11.5.11.H (P. 46)	FCAL	FB4M / FB20	sets the values in accordance with 4~20mA output signals	Factory setting
11.5.11.I (P. 47)	POLL	HART Polling Address	0...15	0
11.5.11.J (P. 47)	PST	Partial Stroke Test	checks a valve status	OFF

11.4 Setting of Main Parameters

The following abbreviations will be used hereafter.

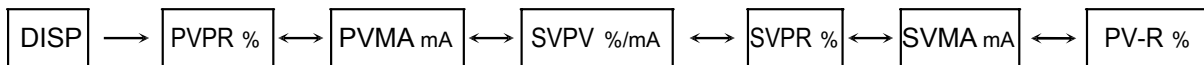


11.4.1 LOCK ON / OFF



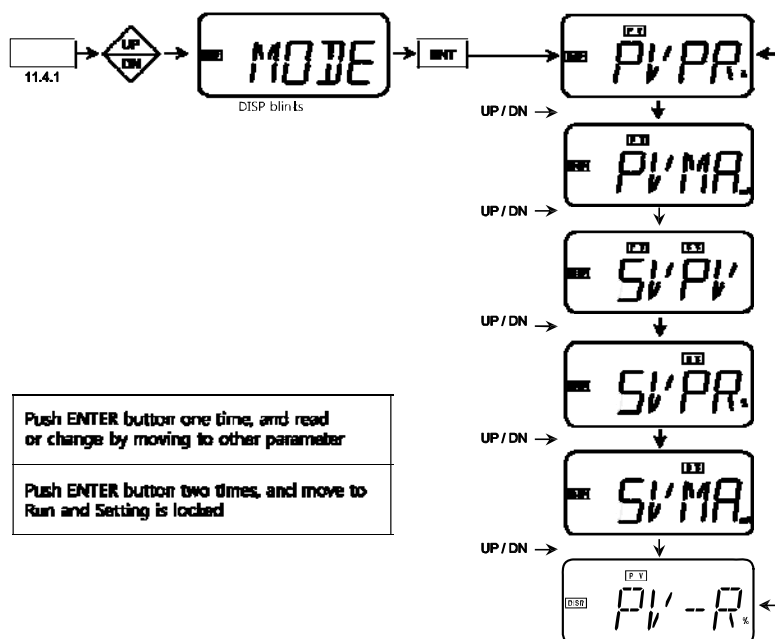
- ① LOCK ON : Saves all setting values.
- ② LOCK : Be sure to LOCK OFF when it is necessary to read or change the selected parameters and the saved setting values.
- ③ Quick auto-calibration, Span, P-Gain can be carried out without LOCK Off (see “ 10. Quick Auto-calibration”)
- ④ LOCK is on unless any input signal is not supplied.
- ⑤ It is difficult to read or change under LOCK ON situation.

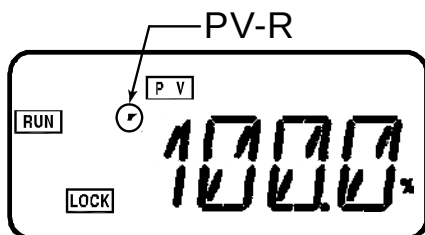
11.4.2 Display Mode



Selection of mA, % or in reverse way with values as shown

(Ex. Reverse: 20% shown → 80% shown)



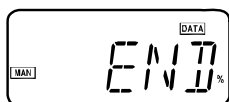
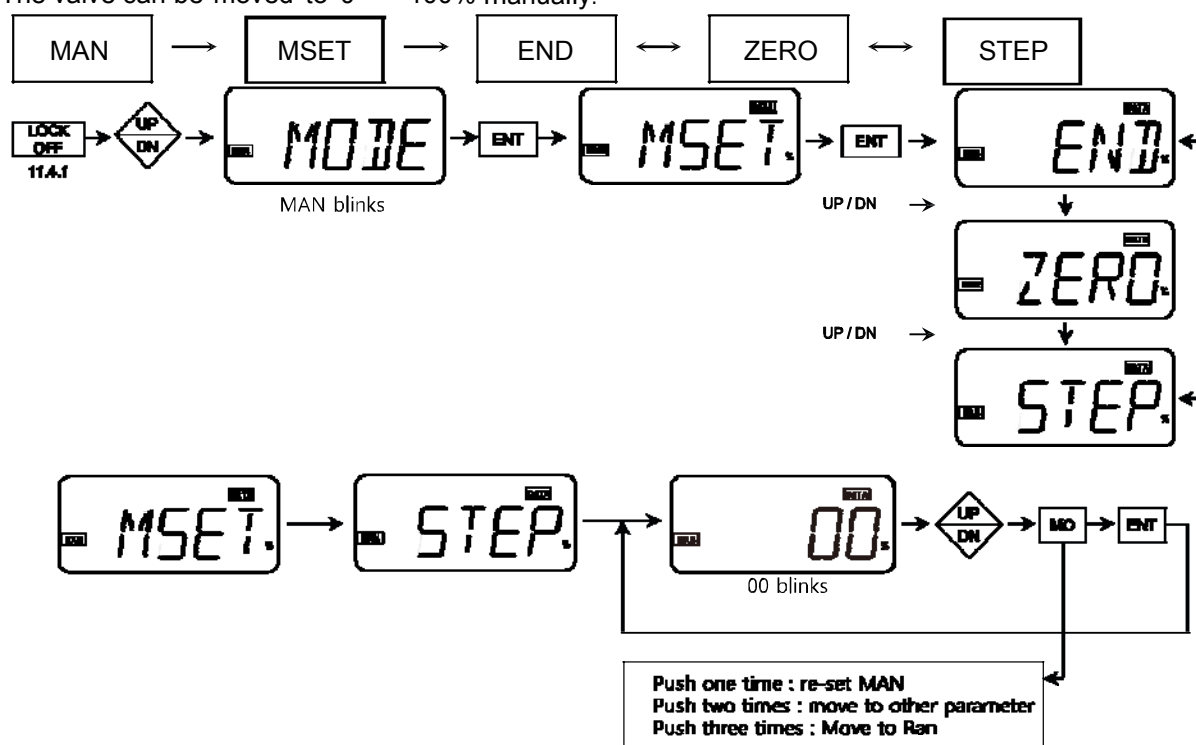


If PV-R is selected, the small point will blink as shown to the left.

Present value(PV) or setting value(SV) is displayed with mA or %. Setting value stands for input signal. If a control valve is a direct acting type and it is necessary to see the feedback values in a reverse way, select PV-R.

11.4.3 Manual Mode (default: 0)

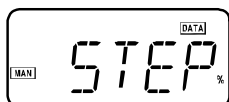
The valve can be moved to 0 – 100% manually.



If END is set, the actuator will move to 100%.

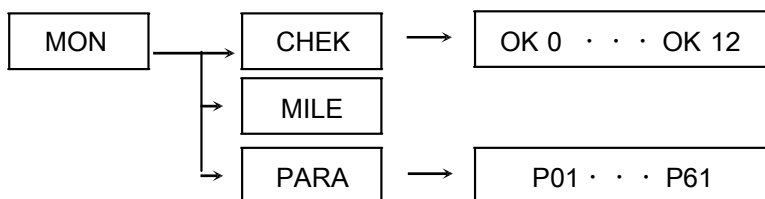


If ZERO is set, the actuator will move to 0%.

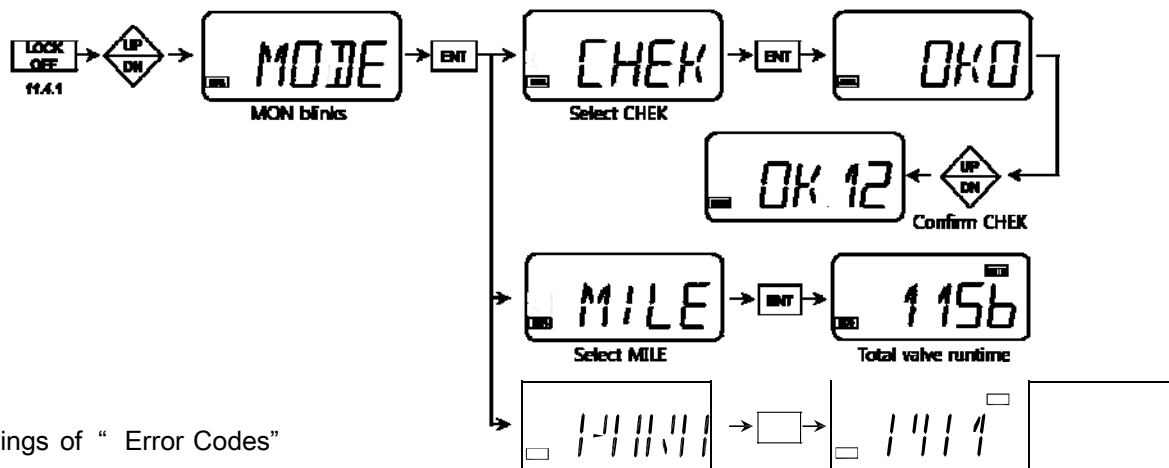


If STEP is selected and UP/DN is pushed, the actuator will move to 1% by 1%

11.4.4 Monitor Mode



You can check the error codes and a total valve runtime.



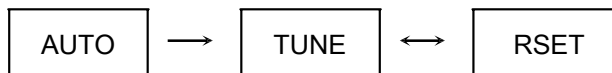
Meanings of “ Error Codes”

Code	Cause	Symptom	Action
CMLO	Low input current (3.7mA)	Data on LCD are shown too dim or too bright.	Re-check 4 – 20mA input signals.
CMHI	High input current (20.5mA)		
IGMI	Down speed long	Slow operation	The actuator is too big. Use the air volume booster.
IGMX	Up speed long		
H/RX	HART Rx error	HART signal failure	Re-set and re-connect will be done after 2.5 seconds, but it is necessary to check the communication system in case of a continuous error.
MONT	Operating angle out of range	MONT is shown during step 4 and an auto-calibration process is finished without completion.	Re-install the SS2L / SS2R positioner.
LOTT	Bias low	The valve is not closed or moves slowly.	Loosen a valve packing.
HITT	Bias high	The valve is not open or moves slowly.	
FBFT	Feedback error (0 - 1%)	PM00 is shown at step 4 and an auto-calibration is finished without completion.	Defectiveness of potentiometer socket contact or PCB board
FBSM	Feedback error (2 - 9%)	The operating stroke is too small and the valve doesn' t work smoothly.	Re-install the potentiometer and increase the operating angle of the feedback lever.
BAD	PST error	BAD is shown.	Check the valve or increase the response time of PST.
PONT	Potentiometer Error	Problem of potentiometer	Check the potentiometer (Potentiometer Ass' y,
RTQ	Coil error	Problem of coil	Check the coil assembly.



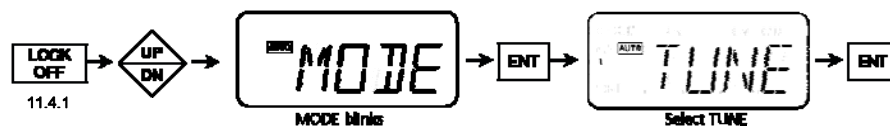
- ① Number 1 corresponds to 10 hour. For example, if 1156 appears, it means that this valve has been working for 11,560 hours.
- ② P01 to P61 are just for a factory setting and only for reference.

11.4.5 Auto-Calibration Mode



If necessary, initialize all setting values to the original values set after auto-calibration or return them to the factory setting values.

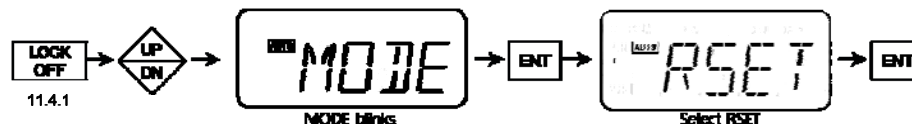
11.4.5.A Performing Auto-Calibration



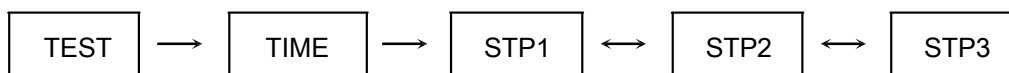
- ① Reverse acting (RA) is a standard factory setting. Even if air lines are connected wrongly by mistake, the SS2 positioner detects automatically and performs auto-calibration for direct acting (DA).
- ② If the actuator doesn't work with 4-20mA input signal properly, change air lines of OUT1 and OUT2 with each other and perform auto-calibration again.
- ③ For a reverse acting type (RA), a countdown will begin like RA-5-4-3-2-1-END.
For a direct acting type (DA), a countdown will begin like 5-RA-DA-4-3-2-1-END.

11.3.4.B Initializing Setting Values (RESET)

All setting values return to the standard factory setting values.

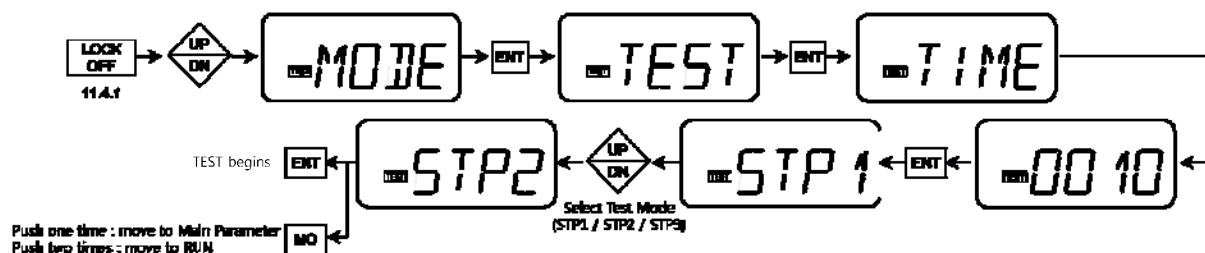


11.4.6 Self-Test Mode



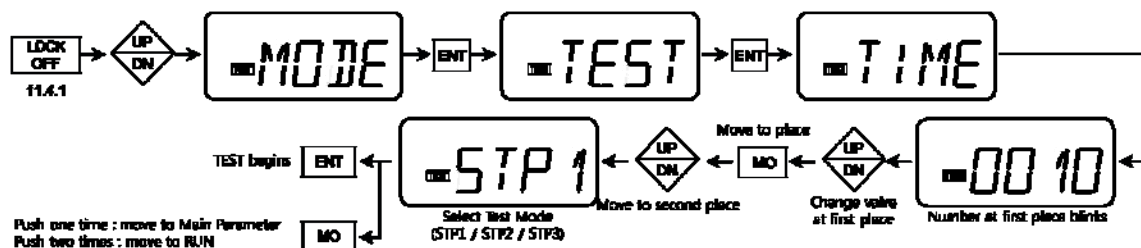
11.4.6.A Check the valve working status by moving regardless of input signals.

- ① STP1: 0% → 50% → 100% → 50% → 0% → Repeat
- ② STP2: 0% → 25% → 50% → 75% → 100% → 75% → 50% → 25% → 0% → Repeat
- ③ STP3: 1% → 10% → 20% ... 90% → 100% → 90% ... 20% → 10% → 0% → Repeat

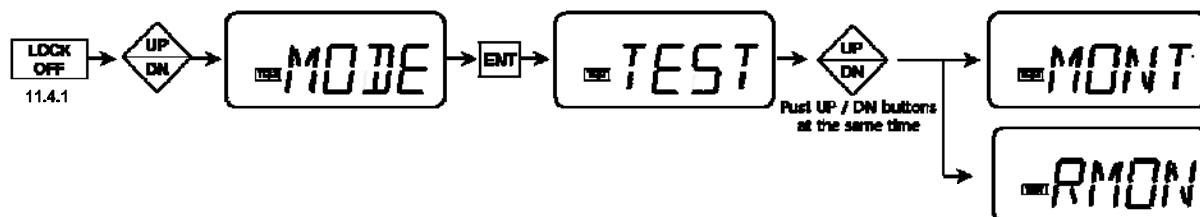


11.4.6.B Test Time Setting for Each Step (default: 10)

Each test step advances at interval of 10 seconds as a standard factory setting.



11.4.6.C Modifications of Internal Settings



- The current valve mounting situation is shown. If the value is far away from 50, the valve will suffer from a poor linearity and hysteresis. Move the positioner and try to reach closer to 50 for the best linearity and hysteresis.

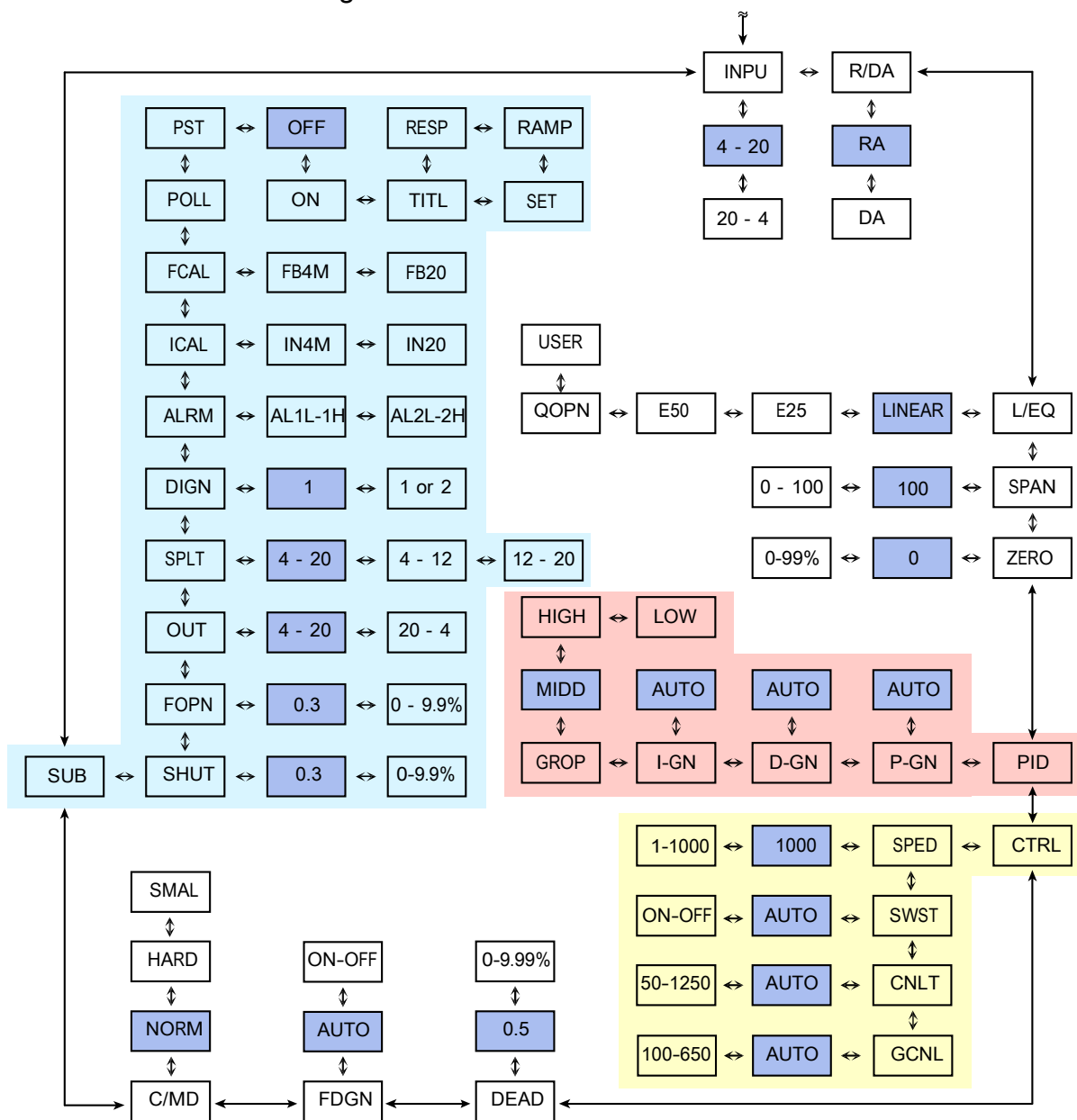
- How to set MONT



For information, in “ MONT” , the operating range (0~10kΩ) of the potentiometer is displayed as %.

- Step 1: Select MONT, and the valve will be fully open or closed and also the actual valve position will be shown as %. If the valve doesn't move any longer, push the ENT button.
- Step 2: If the ENT button is pushed on Step 1, the valve will be fully open or closed and also the actual valve position will be shown as %. If the valve doesn't move any longer, push the ENT button.
- Step 3: If the ENT button is pushed on Step 2, the actual valve position is shown as % in case of the 12mA input signal (50%) by using the actual valve positions got on the above Step 1 and Step 2. The positioner can get the best linearity at the actual valve position of 50%. Move the positioner up or down so that the valve position shown can reach closer to 50 and fix the mounting bracket tightly.

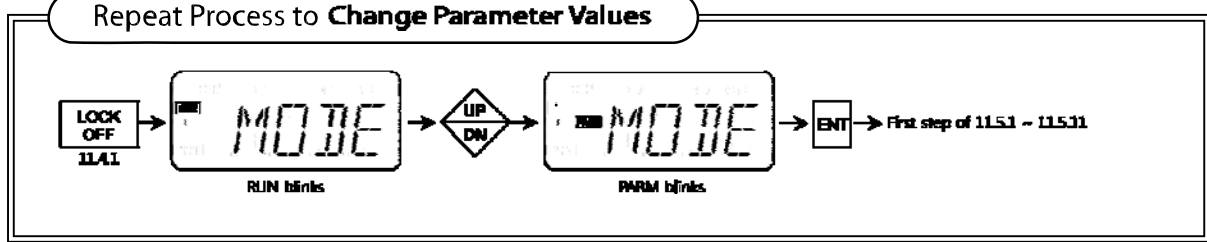
11.5 Parameters Flow Diagram



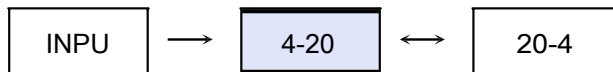
The colored cells stand for the standard factory settings.

All setting values return to the standard factory settings if RESET begins.

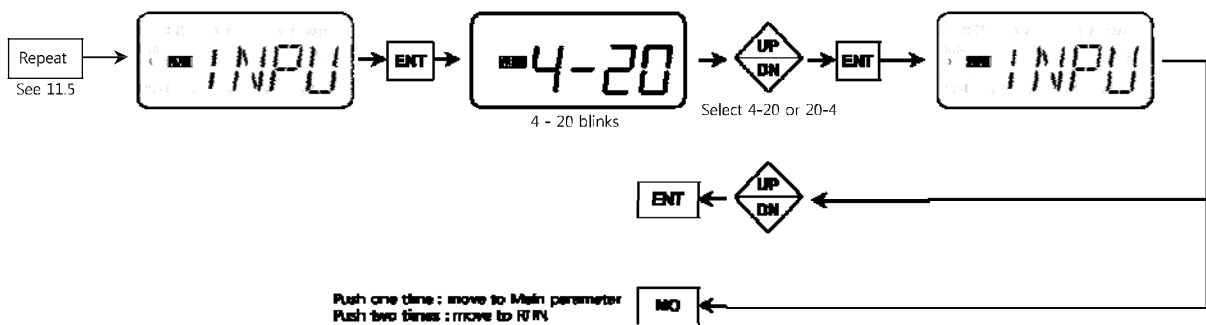
Repeat Process to **Change Parameter Values**



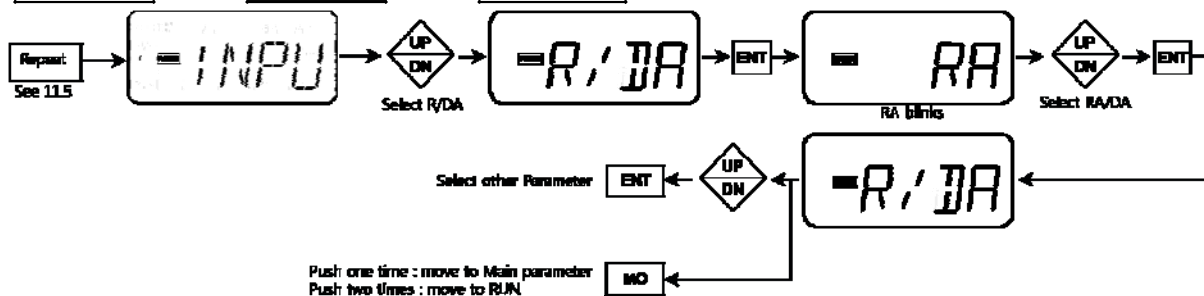
11.5.1 [INPU] Change of Input signal (default: 4-20mA)



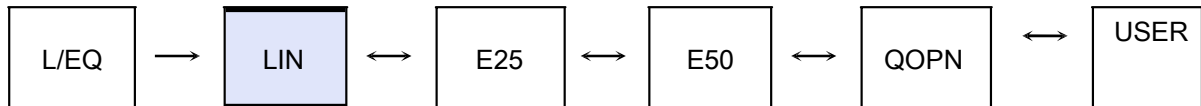
It is possible to make the positioner respond to 20-4mA input signals optionally even though 4-20mA input signals are supplied.



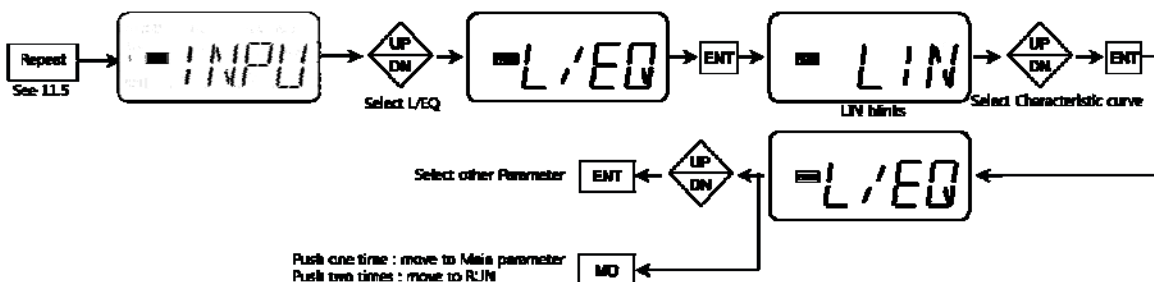
11.5.2 [R/DA] Selection of Direct Acting(DA) or Reverse Acting(RA) (default: RA)

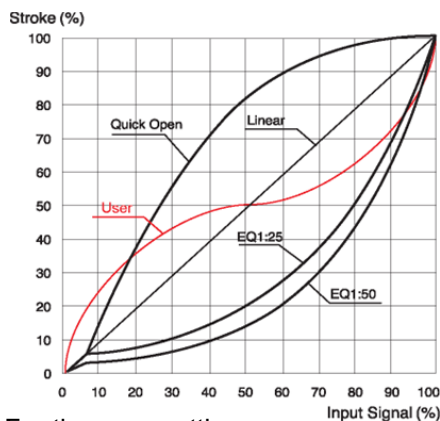


11.5.3 [L/EQ] Change of Linear, E.Q.%, Quick Open or User Set (default: Linear)



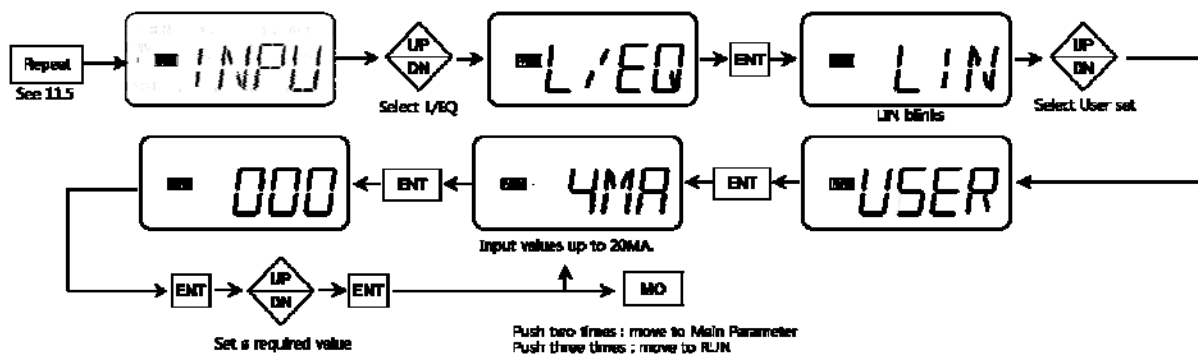
The valve characteristic can be changed to Linear, 1:25 EQ%, 1:50 EQ%, Quick Open or User Set.



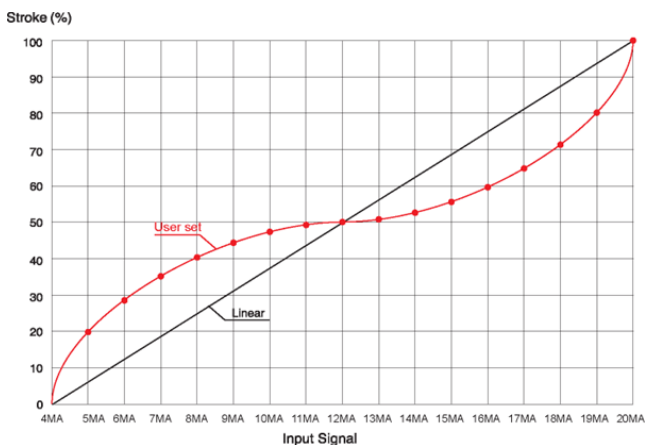


	Linear
	EQ% (1 / 25)
	EQ% (1 / 50)
	Quick Open
	User set(17point)

- For the user setting,

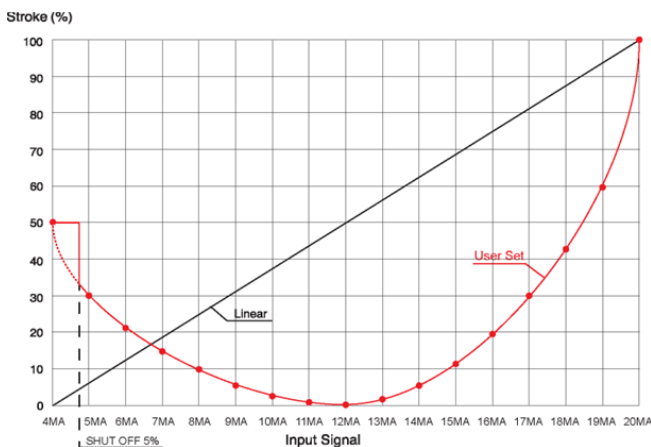


Example 1)



User Set Value			Ex-1	Ex-2
Point	Parameter	Input Signal (mA)	Valve Opening% (set value)	
1	4MA	4mA	0	50
2	5MA	5mA	20	30
3	6MA	6mA	29	20
4	7MA	7mA	35	15
5	8MA	8mA	40	10
6	9MA	9mA	45	6
7	10MA	10mA	48	4
8	11MA	11mA	49	2
9	12MA	12mA	50	0
10	13MA	13mA	51	3
11	14MA	14mA	52	7
12	15MA	15mA	55	11
13	16MA	16mA	60	20
14	17MA	17mA	65	30
15	18MA	18mA	71	43
16	19MA	19mA	80	60
17	20MA	20mA	100	100

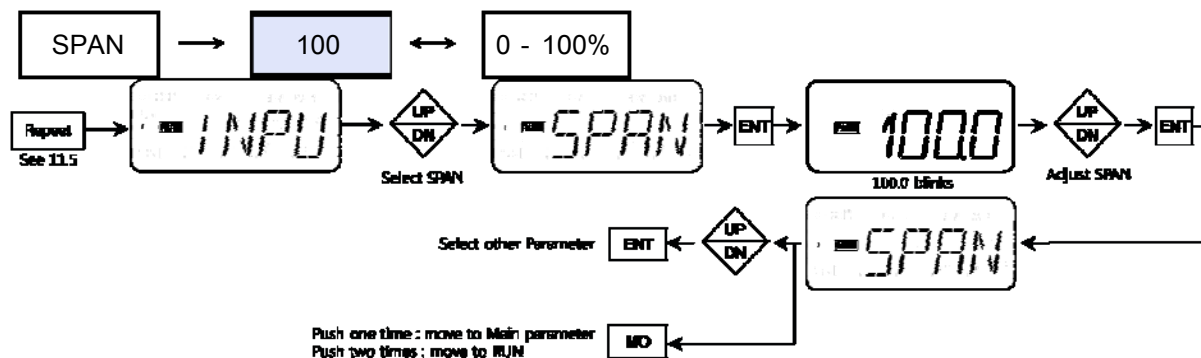
Example 2)



NOTES

1. This user setting has a linear characteristic as standard.
 2. 5MA means % corresponding to 5mA.
 3. Input all 4MA to 20MA for a required user set characteristic curve.
- ※ If Shut Off option is set, the set value at 4mA is maintained during interval of the Shut Off setting value as shown in Example 2).
The curve goes according the user set value after interval of the Shut Off setting value. (0.3% is the default value of Shut Off.)
As Shut-Off is set to 5% in Example 2), the curve maintains by 50% from 4 to 4.8mA and moves forward according to the user set.

11.5.4 [SPAN] Span Adjustment (default: 100)

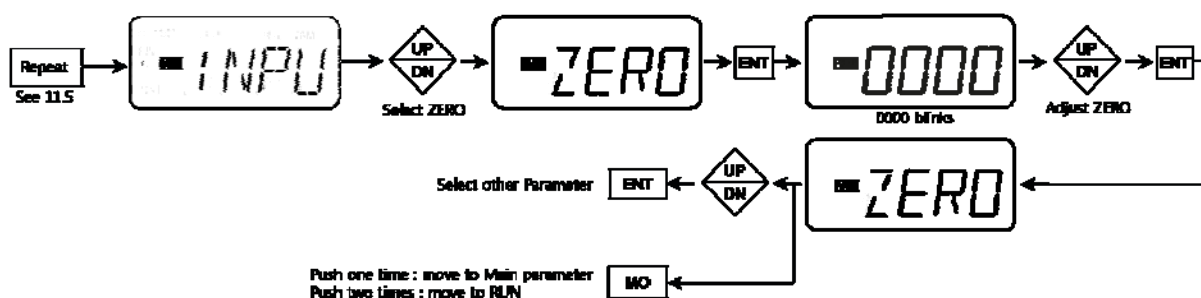


- ① Be sure to supply 20mA input signal before adjusting SPAN.
- ② Push ▼ DN button one time, Span will decrease by 0.1%. Keep pushing ▼ DN button, Span will decrease fast.
- ③ For a quick Span setting, push ▼ DN button for 5 seconds. (see 10.2)

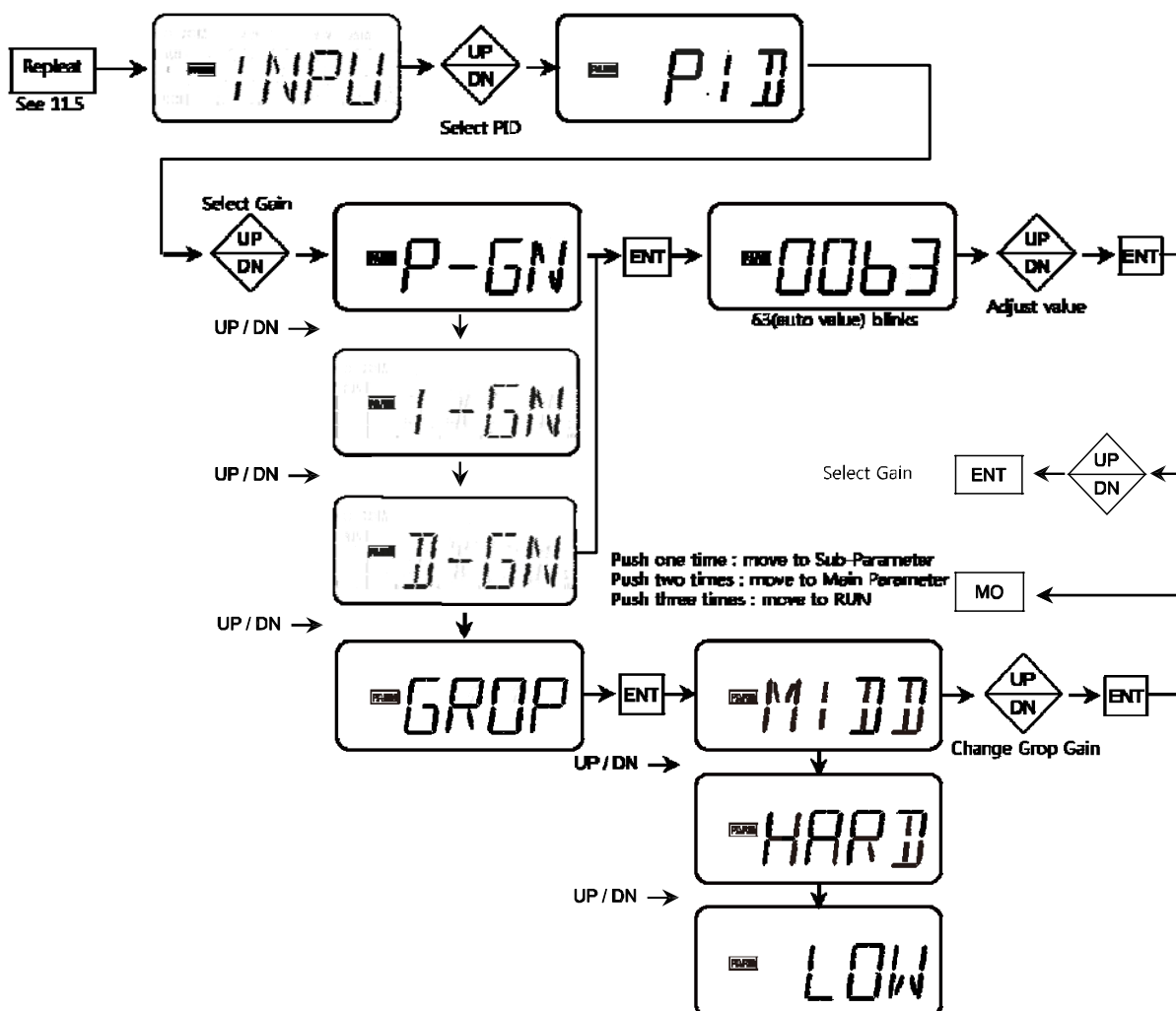
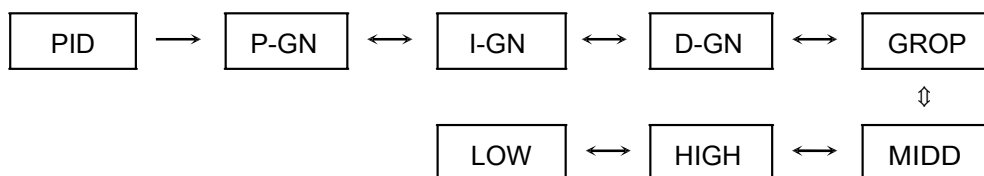
11.5.3 [ZERO] Zero Adjustment (default: 0)

ZERO → 0 ↔ 0 - 99%

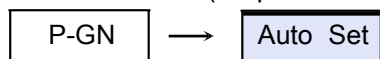
Zero can be adjusted to 0 - 99%.



11.5.6 PID-Gain

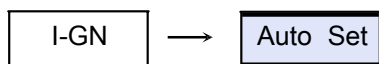


11.5.6.A P-Gain (Proportional Gain)



The micro-processor calculates P-Gain value during auto-calibration process in consideration of sizes of the valve and the actuator. If a hunting problem happens, decrease P-Gain value. If an oscillation problem happens, increase P-Gain value. P-Gain values are different according to the working conditions. In case of a small actuator, increase or decrease 5 to 10. In case of a big actuator, increase or decrease by 20 to 30.

11.5.6.B I-Gain (Integral Gain)



As I-Gain is set automatically during auto-calibration process, it is not necessary to change manually.

11.5.6.C D-Gain (Differential Gain)

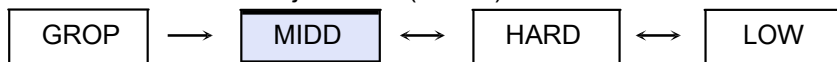


As D-Gain is set automatically during auto-calibration process, it is not necessary to change manually.



- ① Push MO button one time in order to move to ten figures or hundred figures.
- ② For a quick P-Gain setting, push UP button for 5 seconds. (see 10.3)

11.5.6.D GROP-Gain Adjustment (GROP)



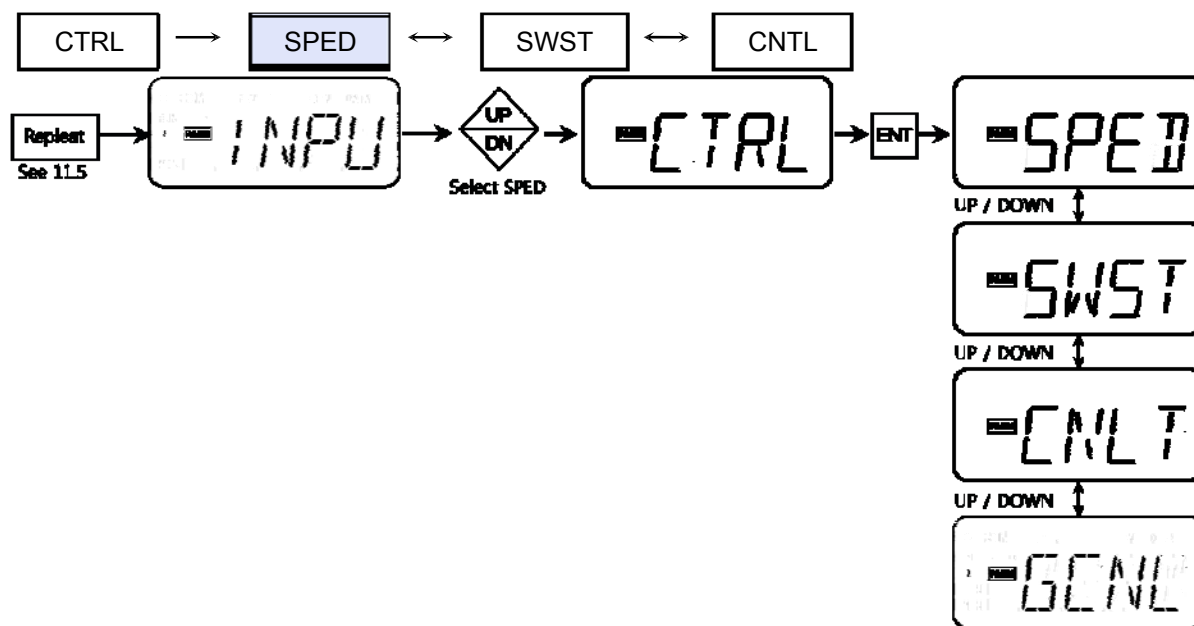
GROP consists of 3 kinds of gain according to Control Mode (NORM, HARD, SMAL). Most hunting or oscillation problems can be solved by selecting HARD or SMAL in Control Mode. But if it is necessary to adjust PID values, MIDD, HARD, LOW can be selected without a full understanding of PID control.

Parameter	Status	Description
		Standard parameter
	Hunting is happening	Change to Hard mode in case of a hunting problem (by rapid under or overshooting)
	Oscillation is happening	Change to Low mode in case of an oscillation problem (by slow under or overshooting)

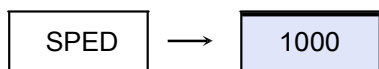


Keep pushing UP button for 3 seconds and move to GROP.

11.5.7 [CTRL] – Control Speed Adjustment



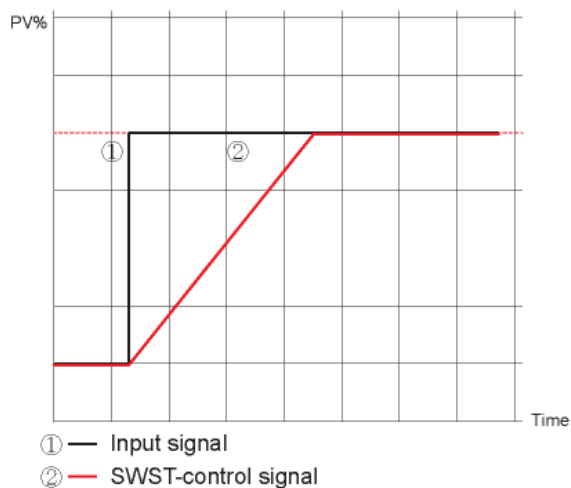
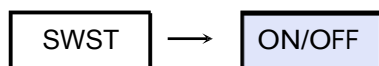
11.5.7.A [SPED] – Respond Speed Adjustment (default: 1000)



This is to adjust the response speed of the control valve. (Min: 1, Max: 1000)



11.5.7.B [SWST] – Slow Start (default: automatically-set)

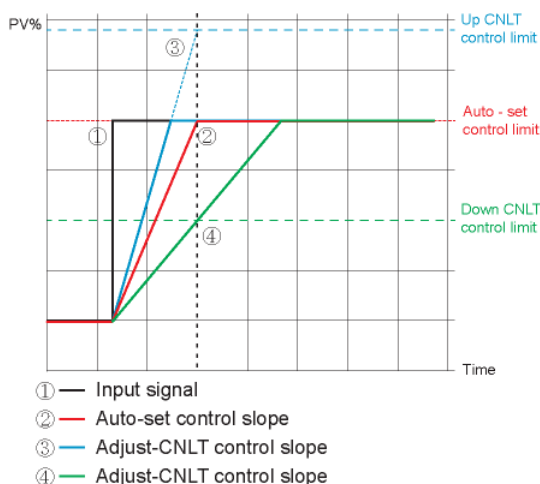
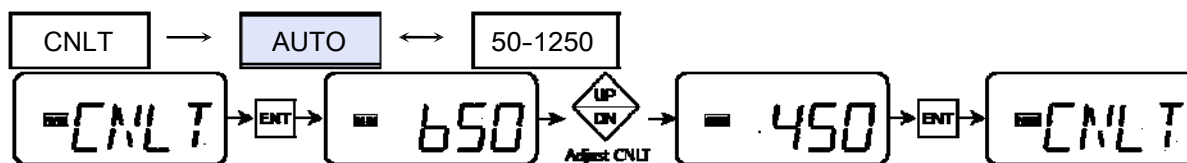


This is to make a valve work slowly. In case of a small actuator, a hunting problem can happen due to a fast movement. This hunting problem can be solved with SWST parameter.



SWST is set automatically during an auto-calibration process if it takes a valve below 1 second to move from 0 to 100%.

11.5.7.C [CNLT] – Control Limit (default: automatically-set)

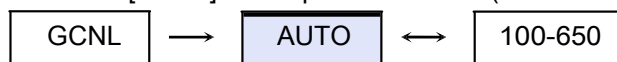


CNLT is to limit a control range and set automatically during an auto-calibration process. When 0% - 100% input signal is supplied, a recognition range of the positioner is settled according to CNLT.

If CNLT is increased as shown in Graph 3, a control speed can become faster but a hunting problem can happen. If CNLT is decreased as shown in Graph 4, a control speed can become slower but the positioner works more stably.

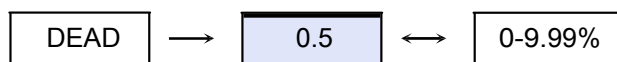
CNTL can be adjusted by 100.

11.5.7.D [GCNL] – Gap Control Limit (default: automatically-set)

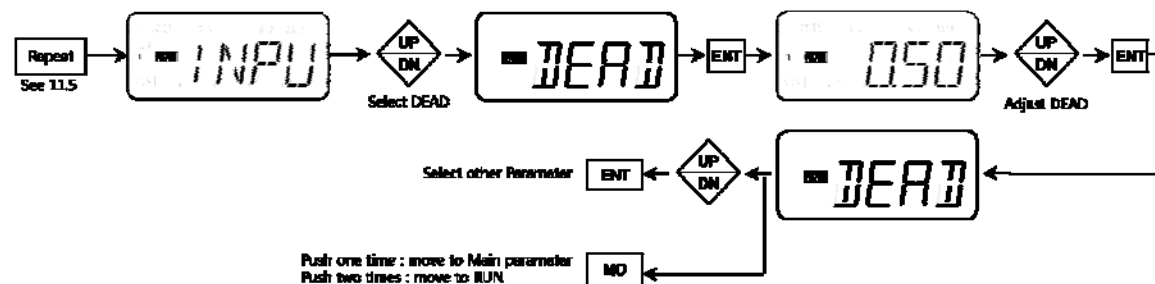


GCNL is to control a whole operating range. If the valve comes within $\pm 3\%$ of input signal, GCNL works with 1/2 value of CNLT for a safer control. In case that a hunting or oscillation problem happens around the position related to the input signal, a safer control can be accomplished by lowering GCNL.

11.5.8 [DEAD] Setting of Dead Band (default: 0.5)



If there is a difference between Setting Value(SV) and Present Value(PV), adjust Dead Band to 0 - 9.99%.



0.5% is a standard factory setting. For reference, 0.50 corresponds to 0.5% and the maximum value is 9.99 % (9.99).

11.5.9 [FDGN] HARD Mode FAST D-Gain



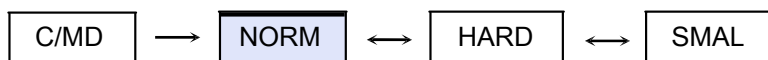
HARD mode BIOS is available only when Control Mode is set to HARD. It is not available with setting of NORM or SMAL.

FDGN is used for a more stable valve control and set automatically during auto-calibration. The user can re-set the FDGN value manually.

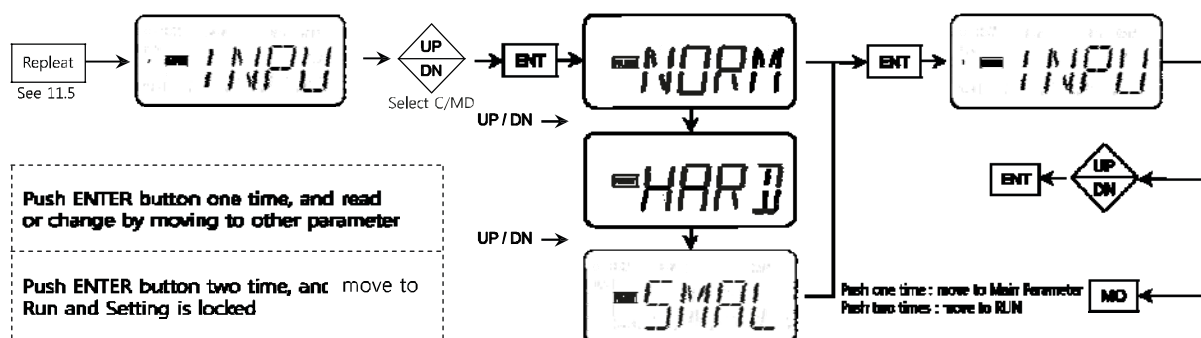
More power (pneumatic torque) is required to move a valve with a strong friction packing and it can cause a hunting or overshooting problem by inertia. By way of prevention, when the positioner reaches to a desired position, air is charged or discharged momentarily for a more stable valve control.

The FDGN value stands for the volume of air charged or discharged. If the FDGN value is set too high, a hunting problem can happen. If too small, FDGN will not be effective.

11.5.10 Control Mode according to Valve Working Condition



Control Mode is set automatically during auto-calibration. But it can be set manually for the current valve working condition in case of a hunting problem or an overshooting problem.



Push ENTER button one time, and read or change by moving to other parameter

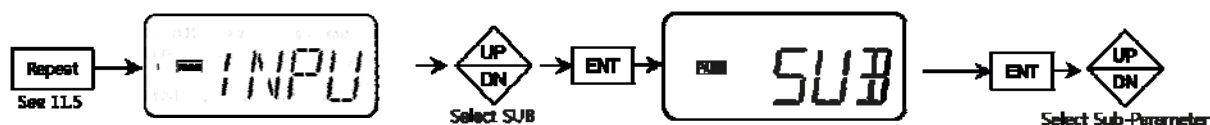
Push ENTER button two time, and move to Run and Setting is locked

	In case of normal actuator
	In case of strong valve packing friction
	In case of small actuator



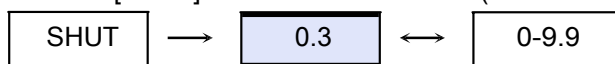
1. Carry out auto-calibration again in case that it is changed to HART from NORM or SMAL.
2. It is not necessary to carry out auto-calibration again in case that it is changed to NORM from SMAL or to SMAL from NORM.

11.5.11 SUB Parameter



Ref.	Parameter	Description	Function	Default
11.5.11.A		Shut-off	0...9.9%	0.3%
11.5.11.B		Full-open	0...9.9%	0.3%
11.5.11.C		Output signal	4...20mA or 20...4mA	4...20mA
11.5.11.D		Split range	4...12mA or 12...20mA	4...20mA
11.5.11.E		Display place	Movement to one or two decimal places	1
11.5.11.F		Alarm limit low, high	AL1L/AL1H, AL2L/AL2H	0...10%, 90...105%
11.5.11.G		IN4M / IN20	Set to values relating to 4-20mA input signal	Factory setting
11.5.11.H		FB4M / FB20	Set to values relating to 4-20mA output signal	Factory setting
11.5.11.I		HART Polling Address	0...15	0
11.5.11.J		Partial Stroke Test	checks a valve status	OFF

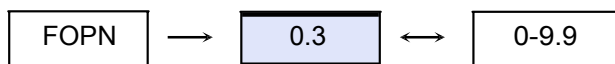
11.5.11.A [SHUT] Valve Shut-off Control (default: 0.3)



It is a safety function to close a valve completely. And it is possible to change 0% to 9.9%. For reference, 0.1% means that the positioner responds to 0.016mA. Therefore, the standard value of 0.3% means that a valve is closed at 4.048mA completely.



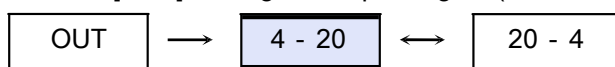
11.5.11.B [FOPN] Valve Full Open Control (default: 0.3)



The valve can be fully open manually. And it is possible to change 0% to 9.9%. For reference, 0.1% means that the positioner responds to 0.016mA. Therefore, the standard value of 0.3% means that a valve is fully open at 19.952mA.



11.5.11.C [OUT] Setting of Output Signal (default: 4 - 20mA)



4 - 20mA is set as a standard factory setting. It is possible to change to 20 - 4mA.



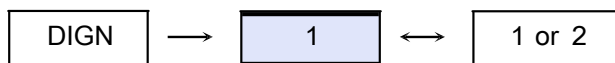
11.5.11.D [SPLT] Split Range Setting (default: 4-20)



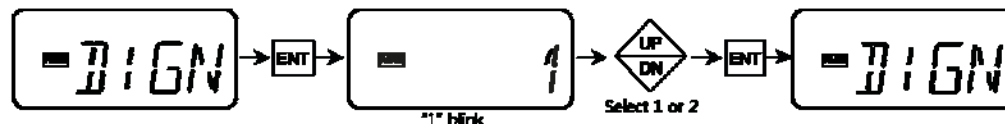
Split range can be set to 4-12mA or 12-20mA.



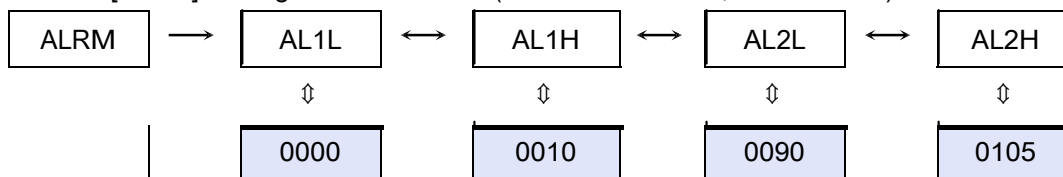
11.5.11.E [DIGN] Change of Decimal Display



Setting value (SV) is displayed by the first decimal place as standard. It is possible to display by the second decimal place. For reference, only mA values can be displayed by the second decimal place. In case of % value, it is limited to display by the first decimal place.



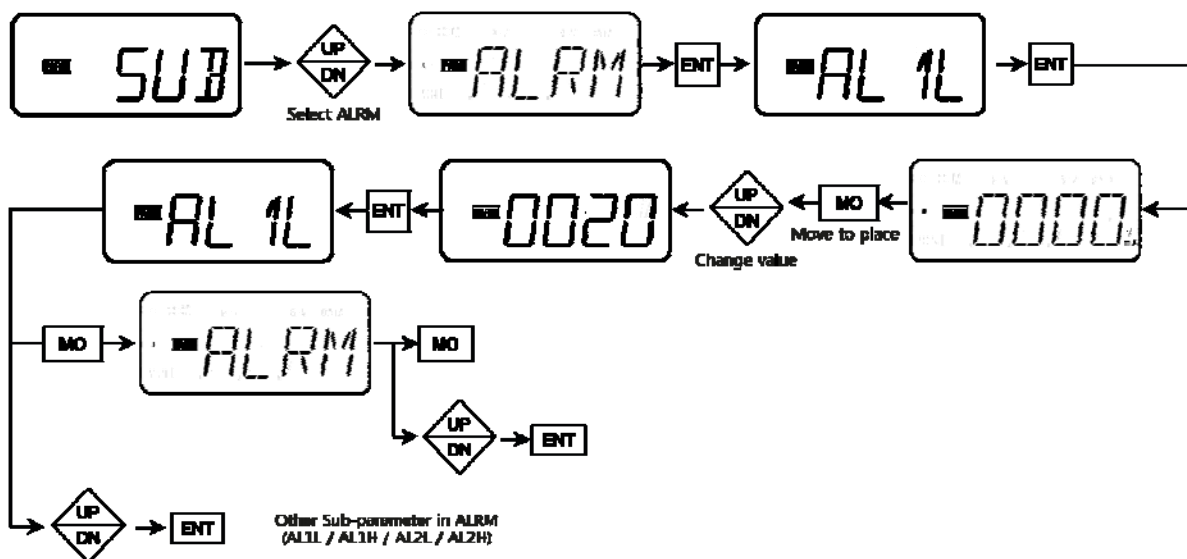
11.5.11.F [ALRM] Setting of Alarm Limits (default: 0 – 10%, 90 – 105%)



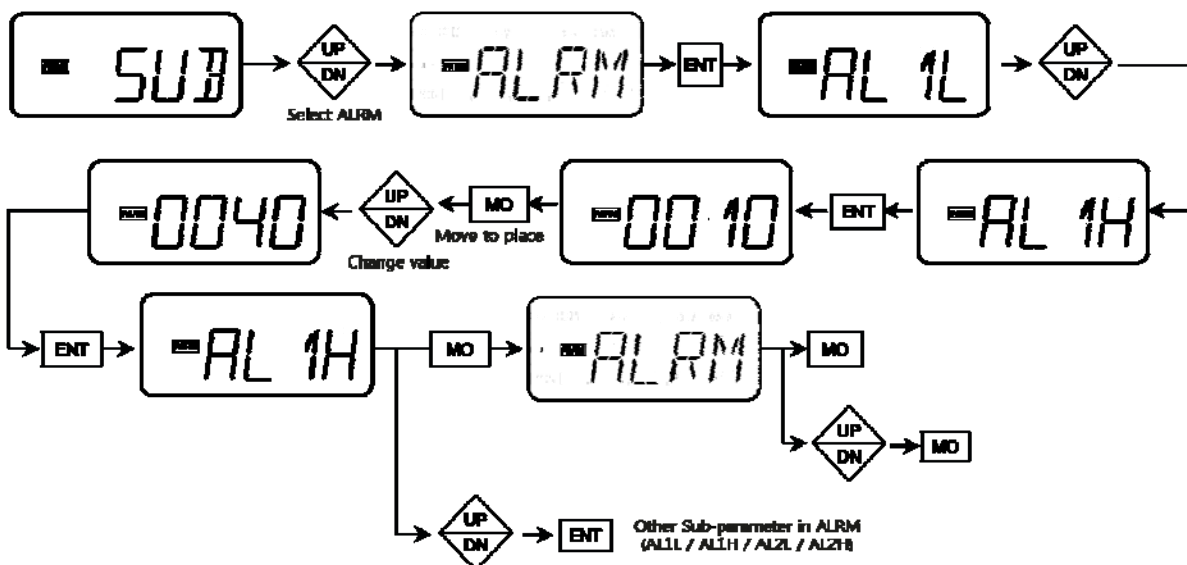
You can set an opening point or a closing point of a control valve. AL1 (L, H) is set to 0 – 10% and AL2 (L, H) is set to 90 – 105% from the factory as standard.

For example, see the below in order to re-set AL1 to 20 – 40% (AL1L = 20, AL1H = 40).

① AL1L Setting

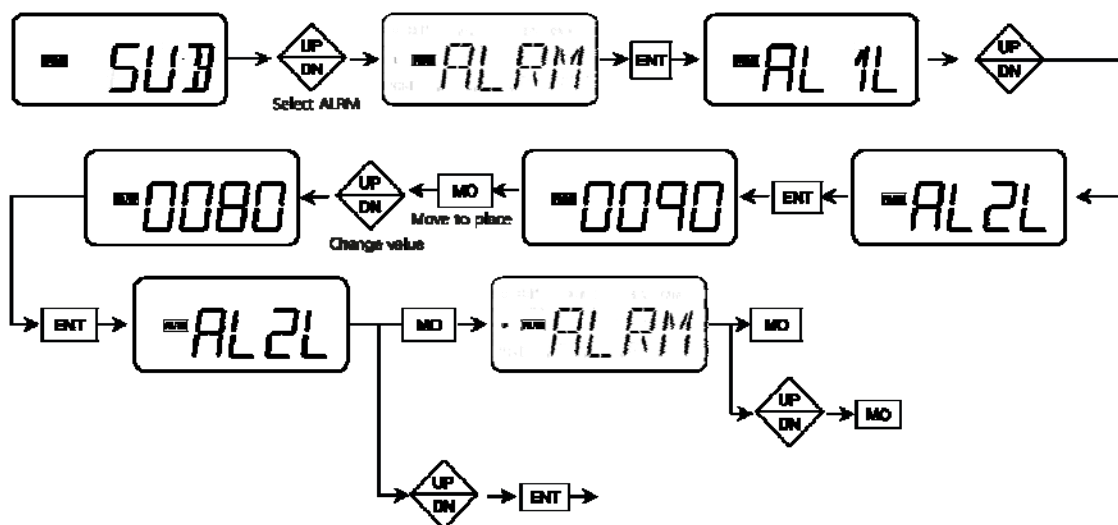


② AL1H Setting

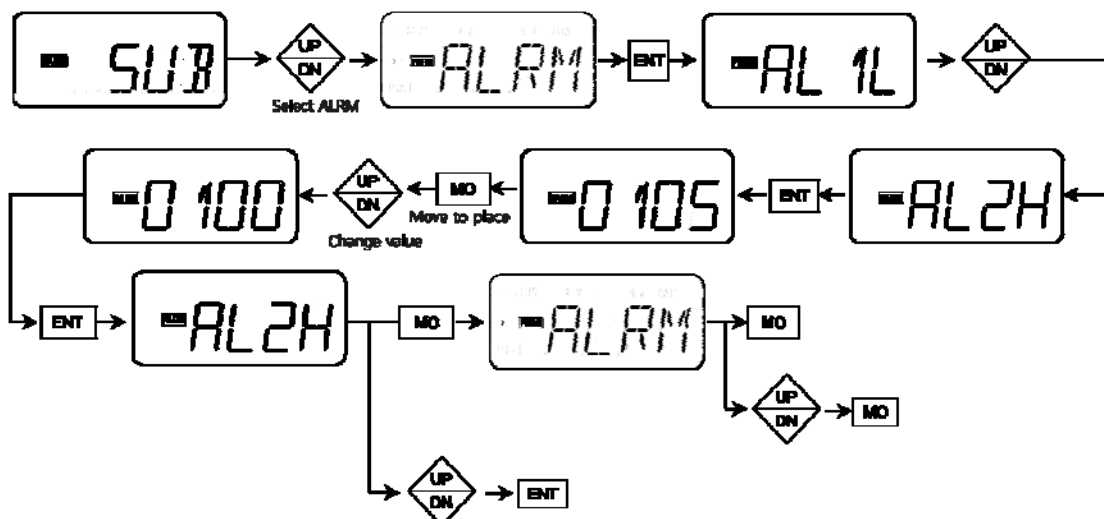


For example, see the below in order to re-set AL2 to 80 – 100%(AL2L = 80, AL2H = 100).

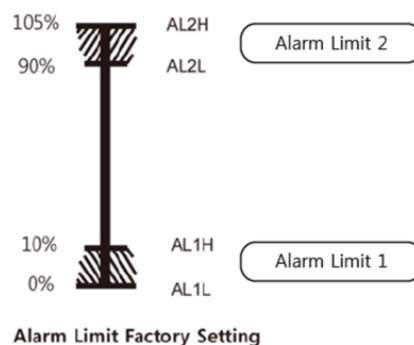
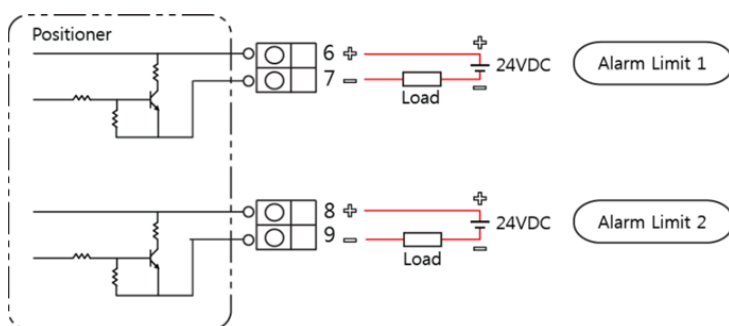
① AL2L Setting



② AL2H Setting

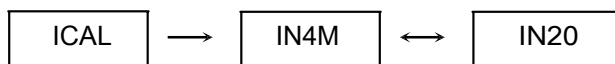


How to wire the Alarm Limits



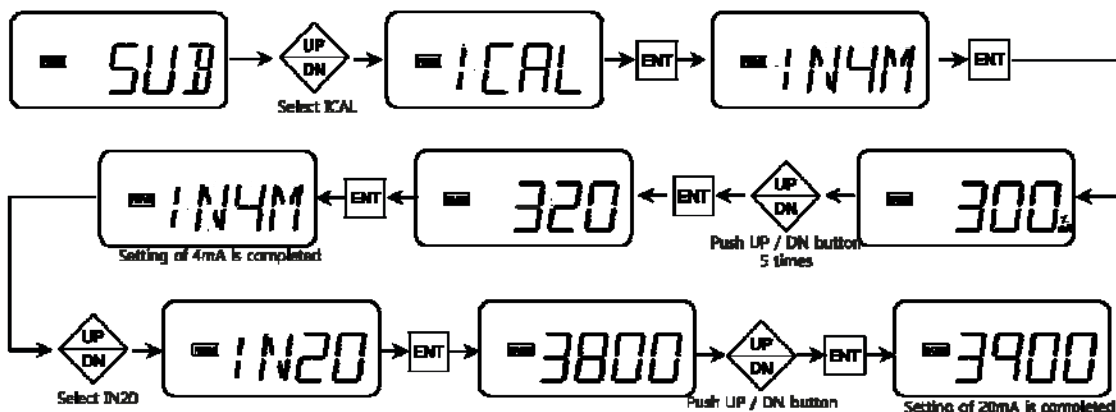
24VDC should be supplied for alarm limits.

11.5.11.G [ICAL] – Setting of Input Signal (default: factory setting)



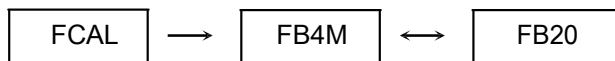
This is to match 4mA and 20mA input signals from a signal calibrator with the internal setting 0% and 100% of the positioner and save onto memory.

If 4mA output signal is measured as 4.2mA and 20mA output signal as 19.8mA with a signal calibrator on site, 4.2mA can be recognized as 0% and 19.8mA as 100% by re-setting with ICAL.



If ICAL is set at 4mA and 20mA, the middle output signals between 4mA and 20mA are set automatically. See [11.5.3 L/EQ] if it is necessary to change other characteristic curve.

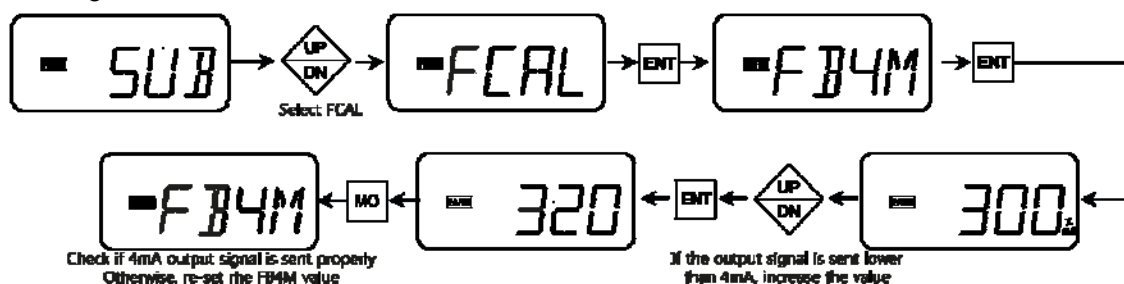
11.5.11.H [FCAL] – Setting of Output Signal (default: factory setting)



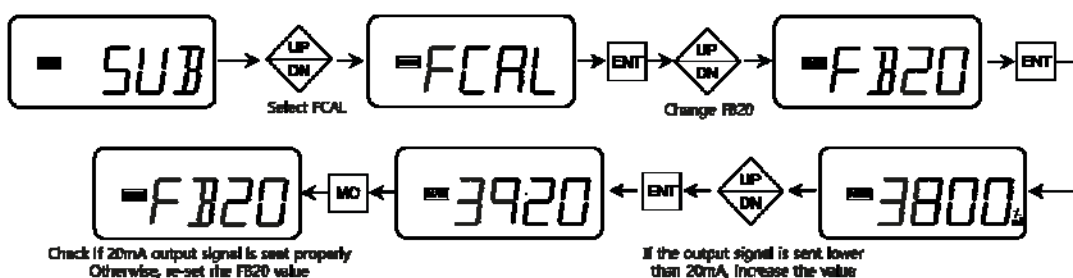
This is to re-set the 4 – 20mA output signals coming from the positioner.

The factory setting is that 4mA is sent at 0% and 20mA is sent at 100%.

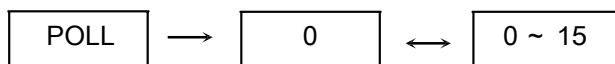
<Setting of FB4M>



<Setting of FB20>



11.5.11.I [POLL] – HART Communication Polling Address (default: 0)

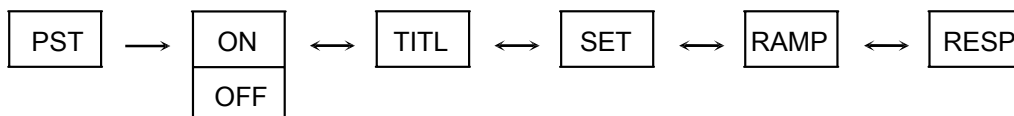


This is to select one of HART communication polling address (0 ~ 15) on site. The default address is “ 0 ” .



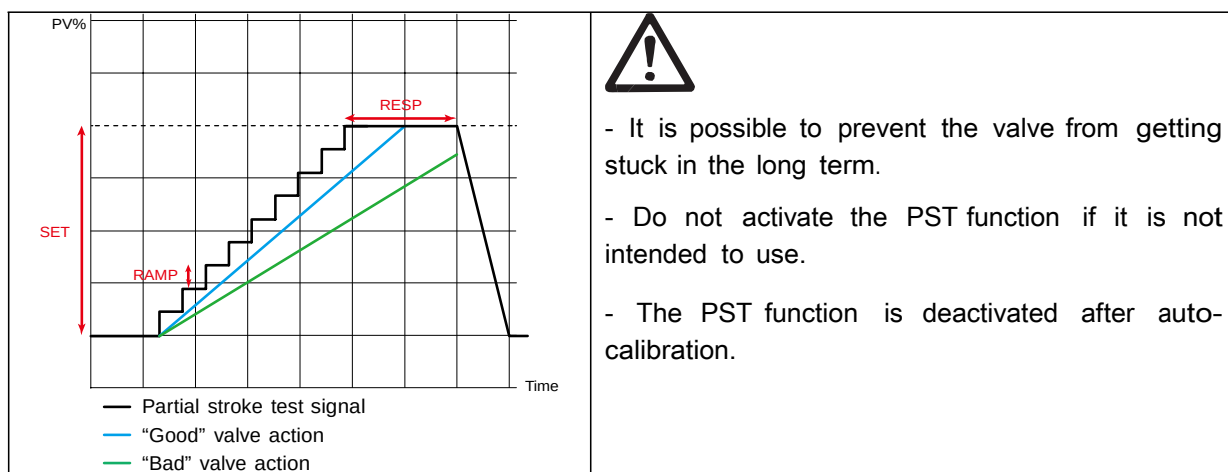
As an unexpected problem can happens during communication, try to select after disconnecting HART communication.

11.5.11.J [PST] – Partial Stroke Test (default: OFF)



This is to move the valve periodically regardless of input signals and check the valve status.

	- to set the TEST time interval (default: ‘ 0024’ – 24 hours) - Setting of ‘ 0000’ shows the PST working status every 1 minute.
	- to set the moving point by % during TEST (default: 10%) - Valve position > 50% : move to the deceasing direction - Valve position < 50% : move to the increasing direction
	- to adjust a moving range per second (default: 1.0%/sec) - One of 1.0, 0.5, 0.25, 0.12, or 0.06%/sec can be selected.
	- to adjust a waiting time that the valve follows after the test signal (default: ‘ 10’ seconds)
Even though ‘ Good’ is shown, if RESP is set too long, the judgment point will not be good for the next comparison. Also, if ‘ Bad’ is shown, RESP is set too low. Adjust RESP.	
	to show that there is no problem if the valve reaches Dead zone of the set position.
	to show that it is necessary to check the valve status if the valve fails to reach Dead zone of the set position.



- It is possible to prevent the valve from getting stuck in the long term.
- Do not activate the PST function if it is not intended to use.
- The PST function is deactivated after auto-calibration.

12. Maintenance / Service

12.1 Preliminary Check Points

12.1.1 Voltage

- The positioner commonly requires 4-20mA @ 24VDC for operation.
- Voltage drop (impedance): Without HART – 8.7VDC (435Ω @ 20mA) With HART – 9.4VDC (470Ω @ 20mA)

12.1.2 Electrical Connections

Check polarities (+, -) of 4-20mA input signal definitely and make the electrical connections.

12.1.3 Pneumatic Connections (see 8.1, 8.2)

12.1.4 Supply Air Quality

A supply air should be definitely clean and compressed free of water, moisture or oil in conformance with IEC 770 and ISA-7.0.01.

12.2 Module Parts

- ① RTQ Coil Assembly (spare part No. 12)
- ② Pilot Valve Assembly (spare part No. 5)
- ③ PCB Control Board Assembly (spare part No. 3)

12.3 Re-setting of Potentiometer (spare part No. 14a, 14b)

It is necessary to adjust a setting of potentiometer as below when a gear position is moved due to user's carelessness. For reference, 0~10kΩ potentiometer is installed into the SS3 positioner.

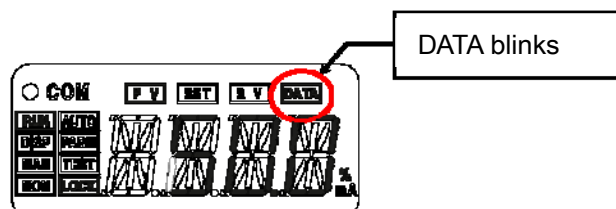
- ① Dis-install the electronic card from the SS3 positioner and make the markings on two gears match with each other.
- ② Move the feedback lever to 50% position and adjust a potentiometer so that it can reach nearly 5kΩ.
- ③ Re-install the SS3 positioner onto the valve and re-perform auto-calibration.

13. Troubleshooting

If the positioner doesn't work properly and

DATA

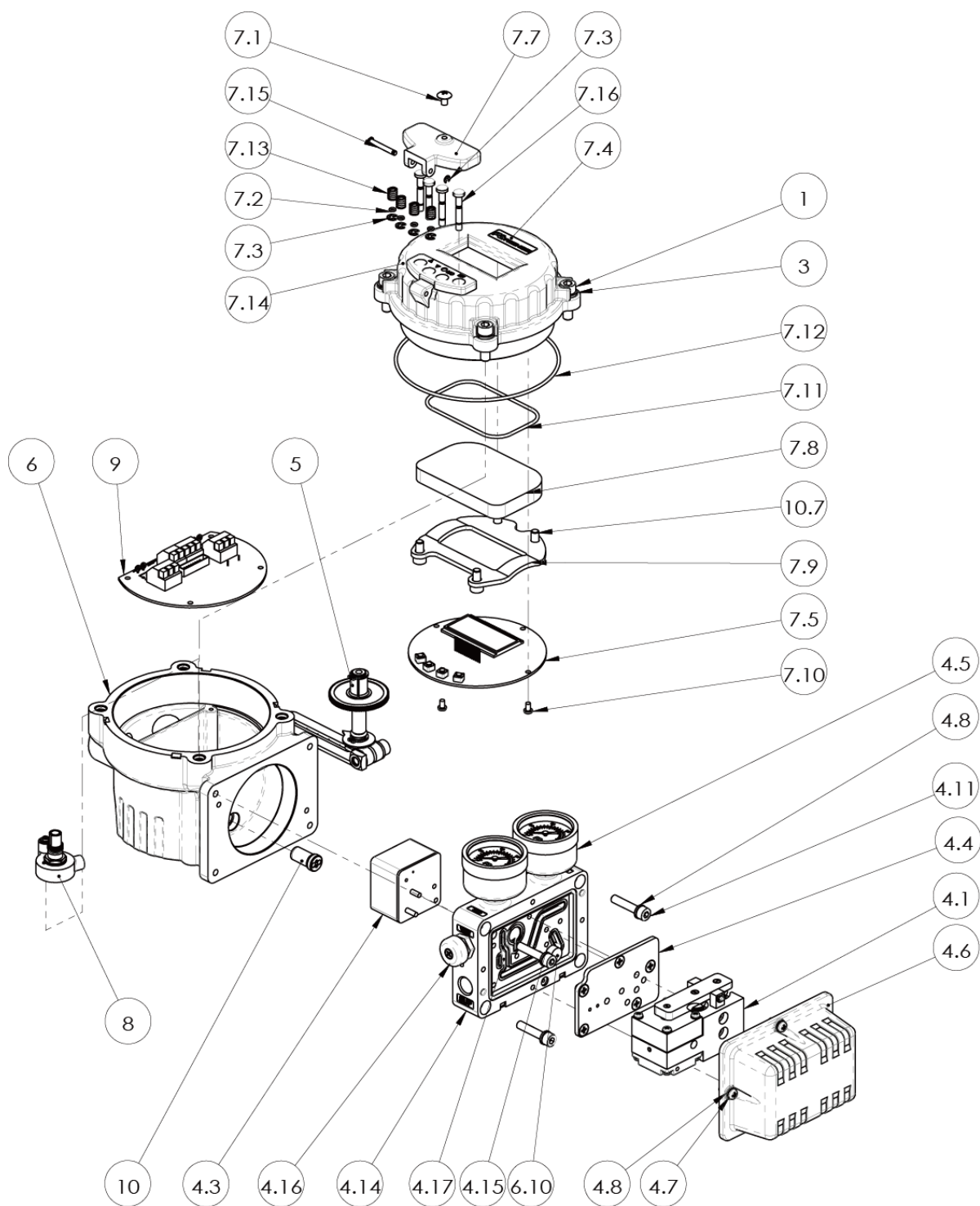
on LCD blinks, try to take action as below.



Error Code	Cause	Symton	Action
CMLO	Low input current (3.7mA)	Data on LCD are shown too dim or too bright.	Re-check 4 – 20mA input signals.
CMHI	High input current (20.5mA)		
IGMI	Down Speed Long	Slow operation	The actuator is too big. Use the air volume booster.
IGMX	Up Speed Long		
H/RX	HART Rx Error	HART signal failure	Re-set and re-connect will be done after 2.5 seconds, but it is necessary to check the communication system in case of a continuous error.
MONT	Operating angle out of range	MONT is shown during step 4 and an auto-calibration process is finished without completion.	Re-install the SS2L / SS2R positioner.
LOTT	Bias Low	The valve is not closed or moves slowly.	Loosen a valve packing.
HITT	Bias High	The valve is not open or moves slowly.	
FBFT	Feedback error (0 - 1%)	PM00 is shown at step 4 and an auto-calibration is finished without completion.	Defectiveness of potentiometer socket contact or PCB board
FBSM	Feedback error (2 - 9%)	The operating stroke is too small and the valve doesn't work smoothly.	Re-install the potentiometer and increase the operating angle of the feedback lever.
BAD	PST error	BAD is shown.	Check the valve or increase the response time of PST.
PONT	Potentiometer Error	Problem of potentiometer	Check the potentiometer (Potentiometer Ass'y,
RTQ	Coil Error	Problem of coil	Check the coil assembly.

14. Spare Parts

14.1 SS3L Spare Parts

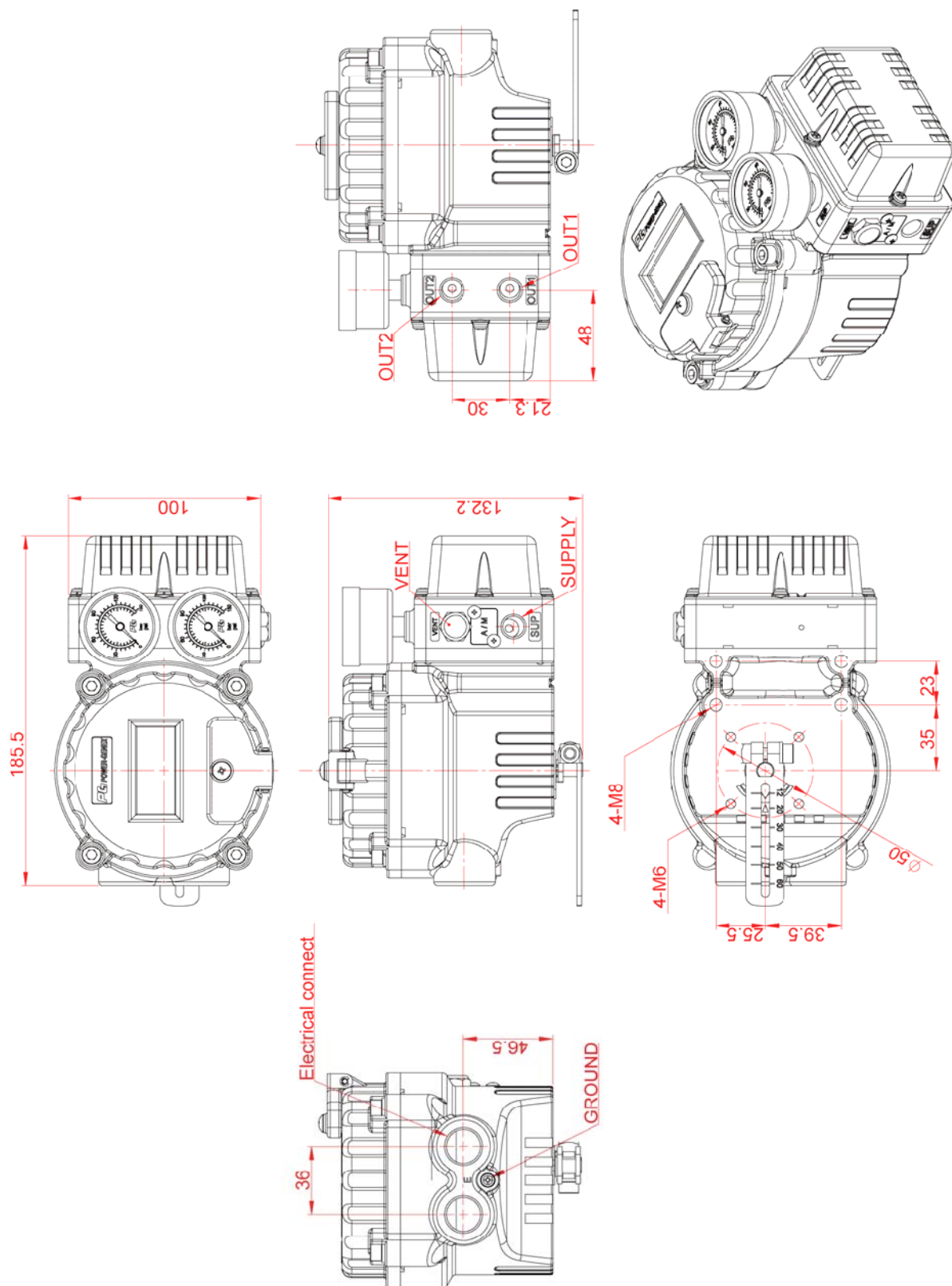


14.3 List of Spare Parts

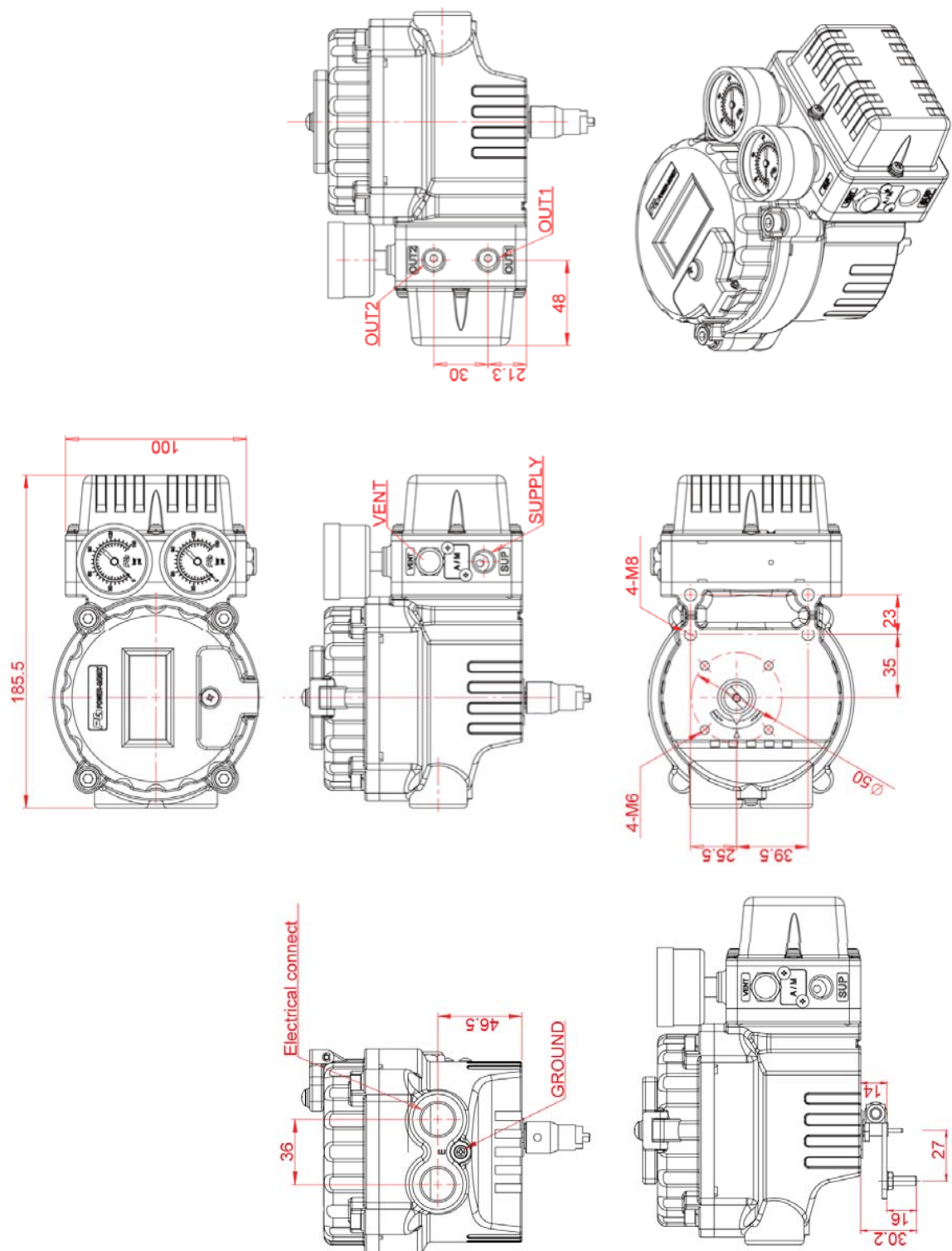
No.	Part No.	Description
3	PG-SS3-01	Air line body
4.1	PG-SS3-02	SS3 pilot valve
4.3	PG-SS3-03	Coil
4.4	PG-SS3-04	Airline plate
4.5	PG-SS3-05	Gauge
4.6	PG-SS3-06	PV cover
6.10	PG-SS3-07	Flame arrest
4.14	PG-SS3-08	Airline body
4.16	PG-SS3-09	Vent Unit
4.17	PG-SS3-10	Airline Oring
5	PG-SS3-11	Shaft
6	PG-SS3-12	SS3 Main body
7	PG-SS3-13	SS3 Cover
7.4	PG-SS3-14	PG logo
7.5	PG-SS3-15	SS3 Main board
7.7	PG-SS3-16	Botton cover
7.8	PG-SS3-17	Glass
7.9	PG-SS3-18	Glass fix plate
7.13	PG-SS3-19	SS3 botton spring
7.14	PG-SS3-20	SS3 main cover
7.15	PG-SS3-21	Cover pin
7.16	PG-SS3-22	Botton
8	PG-SS3-23	Potionmeter Ass' y
9	PG-SS3-24	Terminal board
10	PG-SS3-25	Wire thread

15. Dimensions

15.1 SS3L (linear type)



15.2 SS3R (rotary type)



< Fork lever type >



- (2) **Equipment and protective systems intended for use in potentially explosive atmospheres**
Directive 94/9/EC

EC-TYPE EXAMINATION CERTIFICATE

- (3) Number of the EC type examination certificate: **INERIS 13ATEX0038X**

- (4) Equipment or protective system:

SMART VALVE POSITIONER TYPE SS3...

- (5) Manufacturer: **POWER-GENEX Ltd.**

- (6) Address: **44B9L, 434-9, Nonhyun-Dong, Namdong-Gu
Incheon, 405-848 KOREA**

- (7) This equipment or protective system and any other acceptable alternative of this one are described in the annex of this certificate and the descriptive documents quoted in this annex.

- (8) INERIS, notified body and identified under number 0080, in accordance with article 9 of Council Directive 94/9/EC of the 23rd March 1994, certifies that this equipment or protective system fulfils the Essential of Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres, described in annex II of the Directive.

The examinations and the tests are consigned in report No 027638/13.

- (9) The respect of the Essential Health and Safety Requirements is ensured by:

- conformity with:

EN 60079-0 : 2009

EN 60079-1 : 2007

- specific solutions adopted by the manufacturer to meet the Essential Health and Safety Requirements described in the descriptive documents.

- (10) Sign X, when it is placed following the Number of the EC type examination certificate, indicates that this equipment and protective system is subjected to the special conditions for safe use, mentioned in the annex of this certificate.
- (11) This EC type examination certificate relates only to the design, examination and tests of the specified equipment or protective system in accordance to the directive 94/9/EC. Further requirements of the Directive apply to the manufacturing process and supply of this equipment or protective system, these are not covered by this certificate.
- (12) The marking of the equipment or the protective system will have to contain:

 II 2 G

Verneuil-en-Halatte, 2013.09.04




The Chief Executive Officer of INERIS
By delegation
T. HOUEIX
Ex Certification Officer

(13)

ANNEX

(14)

EC TYPE EXAMINATION CERTIFICATE N° INERIS 13ATEX0038X

(15)

DESCRIPTION OF THE EQUIPMENT OR THE PROTECTIVE SYSTEM

Smart Valve Positioner type SS3 is an equipment protected by flameproof enclosure "Ex d".

PARAMETERS RELATING TO THE SAFETY

Input signal	:	4-20 mA @ 24 VDC
Output position transmitter	:	4-20 mA signal
Min/Max current	:	3.6 mA / 50 mA

MARKING

Marking has to be readable and indelible; it has to include the following indications:

POWER-GENEX Ltd.
Incheon, 405-848 KOREA
SS3...(*)
(Serial number)
(Year of construction)
INERIS 13ATEX0038X



II 2 G

Ex d IIC T6 Gb

T.Amb: -30°C to + 75°C

Cable entries: See instructions

WARNING: DO NOT OPEN WHEN AN EXPLOSIVE ATMOSPHERE IS PRESENT

- (*) The dots are replaced by a codification according to the manufacturing variations. The different types are indicated in the descriptive documents.

Marking may be carried out in the language of the country of use.

The protective system or equipment has also to carry the marking normally stipulated by its construction standards.

ROUTINE EXAMINATIONS AND TESTS

In accordance with clause 16.2 of the EN 60079-1 standard, the equipment defined above is exempted of routine test in owing to the fact that it has undergone a static type test at 4 times the reference pressure.

(16) DESCRIPTIVE DOCUMENTS

The descriptive document quoted hereafter constitutes the technical documentation of the equipment, subject of this certificate.

- Certification file SS3 TYPE

dated and signed on 2011.12.09

(17) SPECIAL CONDITIONS FOR SAFE USE

- The gap of flameproof joints is less than the values specified in the tables of the EN 60079-1 standard.
- The width of the different flameproof joints is superior to the values specified in tables of the EN 60079-1 standard.

(18) ESSENTIAL SAFETY AND HEALTH REQUIREMENTS

The respect of the Essential Health and Safety Requirements is ensured by:

- Conformity to the standards quoted in clause (9).
- All provisions adopted by the manufacturer and defined in the descriptive documents.



The Official Source for HART Communication Technology

CERTIFICATE OF MEMBERSHIP

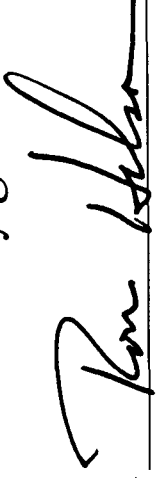
The Board of Directors hereby acknowledges that

Daehan Control Tech Co. Ltd.

has accepted and fulfilled the requirements of the Bylaws
and all rights and privileges of membership are hereby granted.

Membership Term June 2009 - May 2010

By


EXECUTIVE DIRECTOR

Certificate

PROFIBUS Nutzerorganisation e.V. grants to

Power-Genex Ltd.

44B9L, 434-9, Nonhyun-ding, Namdong-gu

406-848 Incheon, South-Korea

the Certificate No: **Z01802** for the PROFIBUS Device:

Model Name: SSPA

Revision: 1.0; SW/FW: 01.00; HW: 01.00

**GSD: PWGX0E19.GSD, File Version: 5.0
pa139710.gsd**

This certificate confirms that the product has successfully passed the certification tests with the following scope:

☒ DP-V0	MS0, Sync, Freeze, Fail_Safe, Set_Slave_Add
☒ DP-V1	MS1, Prm_Block_Structure, MS2, I&M
☒ Profile	PROFIBUS PA 3.02
☒ Physical Layer	MBP

Test Report Number: **MCDL-2013-562-D**

Authorized Test Laboratory: **ITEI, Beijing, China**

The tests were executed in accordance with the following documents:

"Test Specifications for PROFIBUS DP Slaves, Version 3.0.9, September 2008" and

"Test Specifications for PROFIBUS PA Profile 3.0.2, Version 5.0.4, February 2010".

This certificate is granted according to the document:

"Framework for testing and certification of PROFIBUS and PROFINET products".

For all products that are placed in circulation by October 15, 2016 the certificate is valid for life.

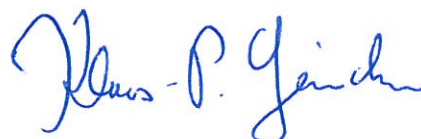
Board of PROFIBUS Nutzerorganisation e. V.



(Official in Charge)



(Karsten Schneider)



(K.-P. Lindner)



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