

SMART POSITIONER YT-3300 / 3350 / 3303 / 3301 SERIES

PRODUCT MANUAL



YT-3300



YT-3300 with limit switch



YT-3350



YT-3303



YT-3301



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1. Introduction

1.1 General Information for the users

Thank you for purchasing Young Tech Co., Ltd products. Each product has been fully inspected after its production to offer you the highest quality and reliable performance. Please read the product manual carefully prior to installing and commission the product.

- The manual should be provided to the end-user.
- **Factory Mutual approved Intrinsically Safe and Non-Incendive units must be Installed Per drwg SKC_18601_150326.pdf**
- **CSA approved Intrinsically Safe and Non-Incendive units must be Installed Per drwg SKC-8465.pdf**
- The manual can be altered or revised without any prior notice. Any changes in product's specification, design, and/or any components may not be printed immediately but until the following revision of the manual.
- When the manual refers to "**Valve Zero / Zero**" means the final valve position upon pneumatic pressure has been fully exhausted from positioner's OUT1 port. The valve zero position may differ between linear direct and reverse actions. (DA/RA)
- The manual should not be duplicated or reproduced for any purpose without prior approval from Young Tech Co., Ltd, Gimpo-si, South Korea.
- In case of any other problems that are not stated in this manual, please make immediate contact to Young Tech co., Ltd.
- Positioner is an accessory of the control valve, so please make sure to read the applicable instruction manual of the control valve prior to installation and operation.

1.2 Manufacturer Warranty

- For the safety, it is important to follow the instructions in the manual. Manufacturer will not be responsible for any damages caused by user's negligence.
- Any modifications or repairs to the product may only be performed if expressed in this manual. Injuries and physical damages caused by customer's modifying or repairing the product without a prior consultation with Young Tech co., Ltd will not be compensated. If any alterations or modifications are necessary, please contact Young Tech Co., Ltd directly.
- Manufacturer warrants the product from the date of original purchase of the product for eighteen (18) months, except as otherwise stated.
- Manufacturer warranty will not cover products that have been subjected to abuse, accidents, alterations, modifications, tampering, negligence, misuse, faulty installation, lack of reasonable care, repair or service in any way that is not contemplated in the documentation for the product, or if the model or serial number has been altered, tampered with, defaced or removed; damages that occurs in shipment, due to act of

God, failure due to power surge, or cosmetic damage. Improper or incorrectly performed maintenance will void this limited warranty.

- For detailed warranty information, please contact the corresponding local Young Tech Co., Ltd office or main office in South Korea.

1.3 Explosion Proof Warning (Only for Intrinsic safety type positioners)

Please ensure the unit is being used and installed in conformity with local, regional, and national explosion proof within the proper safety barrier environment.

- Refer to “2.6 Certifications”
- Explosion proof type of cables and gaskets should be used, when explosion gases are present at the installation site.
- Positioner has 2 ports for power connection. Explosion proof type wires and packing should be used. Blind plug is required when any port is not being used.
- Ring terminal with surface area of more than 0.195mm² with M4 spring washer should be used to connect the power.
- For external ground terminal, ring terminal with surface area of more than 5.5mm² should be used.
- Wiring in these applications shall utilize appropriate methods for Class I, Division 2 / Zone 2
- Substitution of components may impair intrinsic safety.
- Substitution of components may impair suitability for Class I, Division 2.
- EXPLOSION HAZARD. Do not connect or disconnect wiring unless all sources of power have been removed or the area is known to be non-hazardous.
(French) RISQUE D'EXPLOSION. Ne pas raccorder ou débrancher le câblage à moins Toutes les sources d'énergie ont été enlevées ou la zone est connue pour être non dangereux.
- The enclosure of models YT-3300, YT-3301, and YT-3303 contains aluminum, which is considered to constitute a potential risk of ignition when subjected to impact or friction. Care must be used during installation in locating this equipment to prevent impact or friction
- Parts of the enclosure are made of non-metallic materials. To prevent the risk of Electrostatic sparking, clean the enclosure only with a damp cloth.
- The product must be installed in such a manner as to minimize the risk of impact or friction with other metal surfaces.
- For Intrinsically Safe installations, the product must be connected to suitably rated intrinsically safe equipment, and must be installed in accordance with applicable intrinsically safe installation standards.



2. Product Description

2.1 General

YT-3300 / 3350 / 3303 / 3301 series Smart Valve Positioner accurately controls valve stroke in response to an input signal of 4~20mA from the controller. Built-in micro-processor optimizes the positioner's performance and provides unique functions such as **Auto-Calibration, PID Control, and HART Protocol Communications.**

2.2 Main Features and Functions

- LCD display enables users to monitor the positioner status.
- User will easily understand the method of using 4 buttons because it work same in all versions of firmware interfaces.
- When unexpected situation like momentary blackout happens, our positioner boot-time only take 0.5 second and this can minimize the travel of valve which consequentially increase the safety of system.
- Positioner operates normally even there are sudden changes in supply pressure and / or high vibration environment.
- YT-3301 remote positioner is stronger on high temperature and vibration environment because it is separated into feedback sensor and positioner.
- The method of Auto Calibration is very simple.
- As an advantage of having very low air consumption, It could greatly reduce operating costs in large-scale plants.
- It is compatible with most of controllers.
- Orifices can be installed even in the field to minimize the hunting occurrence and optimize operating conditions.
- Various information about positioner can be processed by HART communication (HART option)
- Valve system becomes more stable by outputting analog feedback signal.
- Different valve characteristics can be adjusted – Linear, Quick Open, Equal Percentage, and Custom which user can make 18 points characterizations.
- Tight Shut – Close and Shut - Open can be set.
- PID parameters can be adjusted in the field without any additional communicator.
- A/M switch can be used to direct supply air to the actuator or to manually operate the positioner or valve without any signal.
- Split range 4~12mA or 12~20mA can be set.
- Operating temperature for sensor module of YT-3301 is -40 ~ 120°C.
Operating temperature for positioners is -30 ~ 85°C or -40 ~ 85°C (Please check certified explosion proof temperature)
- Hand calibration function can set Zero point or End point manually.
- It has IP66, Type 4X(FM) protection grade.

- Epoxy polyester powder coating resists the corrosion process. (except YT-3350).
- Maintenance of the positioner is easy because of modularized inner structure.
- SIL2 certified.(For more information, see SIL Safety Instruction on homepage)

2.3 Label Description

- **MODEL NUMBER:** Indicates the model number and any options of the positioner.
- **EXPLOSION PROOF:** Indicates certified explosion proof grade.
- **INPUT SIGNAL:** Indicates input signal range.
- **OPERATING TEMP.:** Indicates the allowable operating temperature.
- **AMBIENT TEMP.:** Indicates the allowable ambient temperature for explosion proof.
- **SUPPLY PRESSURE:** Indicates the supply pressure range.
- **Ui, li, Pi, Ci, Li:** Indicates the allowable electrical data in the certificate.
ATEX: Ui = 28 V, li = 93 mA, Pi = 651 mW, Ci = 0.6 nF, Li = 10 μH
FM: Ui = 28 V, li = 93 mA, Pi = 651 mW, Ci = 0.55 nF, Li = 12 μH
You can also see the details in the certificate.
- **SERIAL NUMBER:** Indicates unique serial number.
- **YEAR :** Indicates manufactured year.

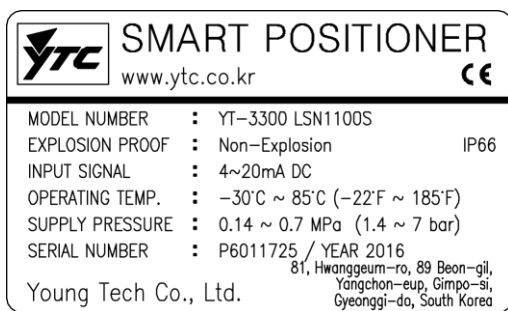


Fig. L-1: YT-3300 / 3303 / 3301 Non-explosion proof

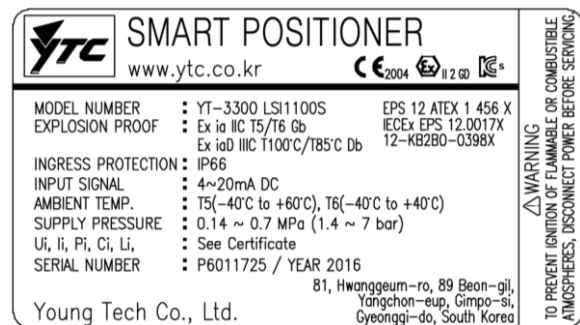


Fig. L-2: YT-3300 / 3303 / 3301 Intrinsic safety type (ATEX, IECEx, KCs)

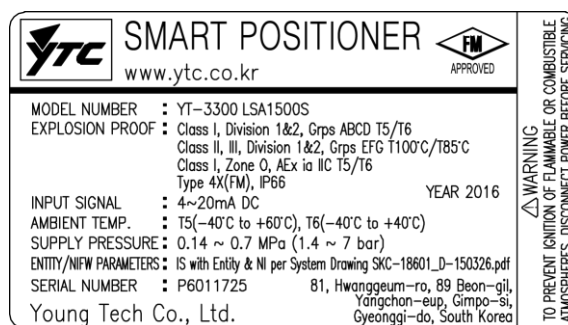


Fig. L-3: YT-3300 / 3303 / 3301 / 3302 Intrinsic safety type (FM)

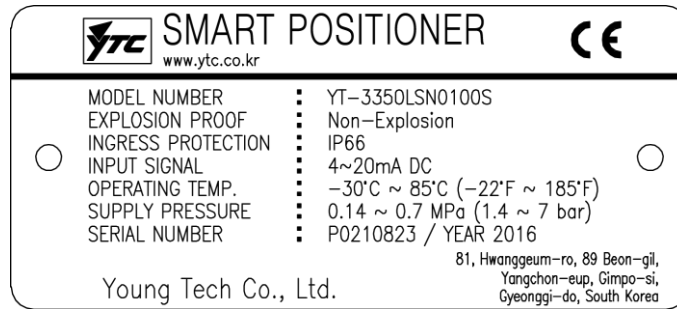


Fig. L-4: YT-3350 Non-explosion proof

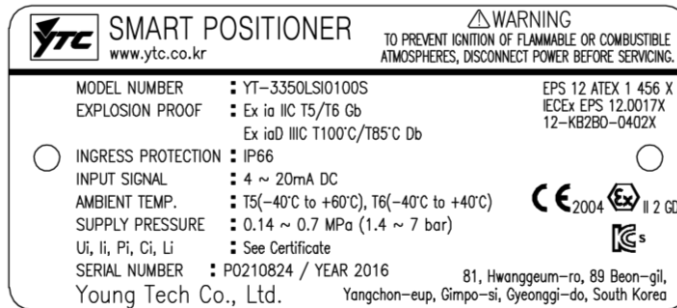


Fig. L-5: YT-3350 Intrinsic safety type
 (ATEX, IECEX, KCs, etc.)

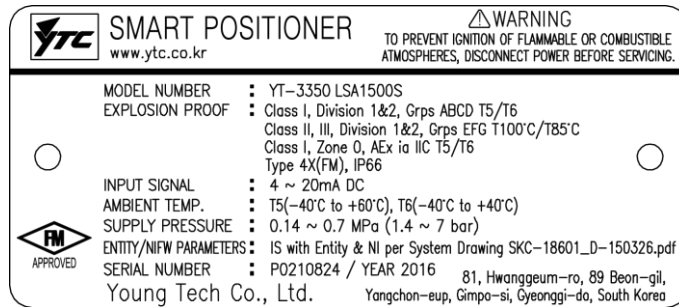


Fig. L-6: YT-3350 Intrinsic safety type
 (FM)

2.4 Product Number

2.4.1 YT-3300 / 3350 series follows suffix symbols as follows.

YT-3300 / 3350 1 2 3 4 5 6 7 8

1	Motion Type	L: Linear (positioner is attached the right yoke of actuator.) R: Rotary
2	Acting type	S: Single D: Double
3	Explosion Proof	N: Non-Explosion i: ATEX, IECEx, KCs, NEPSI: Ex ia IIC T5/T6 Gb, Ex iaD IIIC T100°C/T85°C Db, IP66 A: FM & CSA(pending) : Class I, Division 1&2 Groups ABCD T5/T6 Class II, Division 1&2 Groups EFG T100°C/T85°C; Class III Class I, Zone 0, AEx ia IIC T5/T6, Ex ia IIC T5/T6 Ga; Ex tb IIIC T100°C/T85°C Db Type 4X(FM), IP66
4	Lever Type	0: 10 ~ 40 mm (Standard type) 1: 20 ~ 100 mm (Standard type) 2: 90 ~ 150 mm (Standard type) 3: 16 ~ 30 mm (Adapter type) 4: 16 ~ 60 mm (Adapter type) 5: 16 ~ 100 mm (Adapter type) 6: 90 ~ 150 mm (Adapter type)
	Linear	
	Rotary	1: M6 x 34L 2: M6 x 63L 3: M8 x 34L 4: M8 x 63L 5: Namur
5	Conduit - Air Connection Type	1: G 1/2 - PT 1/4 2: G 1/2 - NPT 1/4 (YT-3350 is available for No. 2 ONLY) 3: G 1/2 - G 1/4 4: M20(Adapter type) - NPT 1/4 5: NPT 1/2 - NPT 1/4
6	Communication	0: None 2: + HART Communication
7	Option	0: None 1: + Position Transmitter 2: + Limit Switch(Mechanical Type) 3: + Limit Switch(Proximity Type) 4: + Position Transmitter and Limit Switch (Mechanical Type) 5: + Position Transmitter and Limit Switch (Proximity Type)
8	Operating Temp.	S: -30°C ~ 85°C (-22°F ~ 185°F) L: -40°C ~ 85°C (-40°F ~ 185°F)

2.4.2 YT-3303 series follows suffix symbols as follows.

YT-3303 1 2 3 4 5 6 7 8

1	Motion Type	L: Linear (positioner is attached the left yoke of actuator.) R: Rotary
2	Acting type	S: Single D: Double
3	Explosion Proof	N: Non-Explosion i: ATEX, IECEX, KCs, NEPSI: Ex ia IIC T5/T6 Gb, Ex iaD IIIC T100°C/T85°C Db, IP66 A: FM & CSA(pending) : Class I, Division 1&2 Groups ABCD T5/T6 Class II, Division 1&2 Groups EFG T100°C/T85°C; Class III Class I, Zone 0, AEx ia IIC T5/T6, Ex ia IIC T5/T6 Ga; Ex tb IIIC T100°C/T85°C Db Type 4X(FM), IP66
4	Lever Type	1: 10 ~ 40 mm 2: 20 ~ 70 mm 3: 50 ~ 100 mm 4: 100 ~ 150 mm
	Linear	
	Rotary	1: M6 x 34L 2: M6 x 63L 3: M8 x 34L 4: M8 x 63L 5: Namur
5	Conduit – Air Connection Type	1: G 1/2 - PT 1/4 2: G 1/2 - NPT 1/4 3: G 1/2 - G 1/4 4: M20(Adapter type) - NPT 1/4 5: NPT 1/2 - NPT 1/4
6	Communication	0: None 2: + HART Communication
7	Option	0: None 1: + Position Transmitter
8	Operating Temp.	S: -30°C ~ 85°C (-22°F ~ 185°F) L: -40°C ~ 85°C (-40°F ~ 185°F)

2.4.3 YT-3301 series follows suffix symbols as follows.

YT-3301 1 2 3 4 5 6 7 8 9

1	Motion Type	L : Linear R : Rotary
2	Acting type	S : Single D : Double
3	Explosion Proof	N : Non-Explosion i : ATEX, IECEX, KCs, NEPSI: Ex ia IIC T5/T6 Gb, Ex iaD IIIC T100°C/T85°C Db, IP66 A : FM & CSA(pending) : Class I, Division 1&2 Groups ABCD T5/T6 Class II, Division 1&2 Groups EFG T100°C/T85°C; Class III Class I, Zone 0, AEx ia IIC T5/T6, Ex ia IIC T5/T6 Ga; Ex tb IIIC T100°C/T85°C Db Type 4X(FM), IP66
4	Lever Type	1 : 10 ~ 40 mm 2 : 20 ~ 70 mm 3 : 50 ~ 100 mm 4 : 100 ~ 150 mm
	Linear	
	Rotary	5 : Namur
5	Conduit – Air Connection Type	1 : G 1/2 - PT 1/4 2 : G 1/2 - NPT 1/4 3 : G 1/2 - G 1/4 4 : M20(Adapter type) - NPT 1/4 5 : NPT 1/2 - NPT 1/4
6	Communication	0 : None 2 : + HART Communication
7	Option	0 : None 1 : + Position Transmitter
8	Operating Temp.	S : -30°C ~ 85°C (-22°F ~ 185°F) L : -40°C ~ 85°C (-40°F ~ 185°F)
9	Cable Length ¹⁾	1 : 5m 2 : 10m 3 : 15m 4 : 20m

¹⁾ Maximum cable length is 20m.

2.5 Product Specification

2.5.1 YT-3300 / 3303 / 3350 Specification

Model		YT-3300 / 3303		YT-3350	
Housing Material		Aluminum Die-casting		Stainless Steel 316	
Motion Type		Linear	Rotary	Linear	Rotary
Acting Type		Single / Double			
Input Signal		4~20mA DC			
Minimum Current Signal		3.2mA(Standard), 3.8mA(Hart Included)			
Supply Pressure		0.14 ~ 0.7 MPa (1.4 ~ 7 bar)			
Stroke		10 ~ 150 mm	0 ~ 90°	10 ~ 150 mm	0 ~ 90°
Impedance		Max. 500Ω @ 20mA DC			
Air Connection		PT, NPT, PF(G) 1/4		NPT 1/4	
Gauge Connection		PT, NPT 1/8		NPT 1/8	
Conduit Entry		G(PF) 1/2 or NPT 1/2 or M20*1.5P		G(PF) 1/2	
Ingress Protection		IP66, Type 4X(FM)			
Explosion Proof		ATEX, IECEx, KCs, NEPSI: Ex ia IIC T5/T6 Gb, Ex iaD IIIC T100°C/T85°C Db, IP66 FM & CSA(Pending) : Class I, Division 1&2 Groups ABCD T5/T6 Class II, Division 1&2 Groups EFG T100°C/T85°C; Class III Class I, Zone 0, AEx ia IIC T5/T6, Ex ia IIC T5/T6 Ga; Ex tb IIIC T100°C/T85°C Db			
Operating Temperature	Standard Type	-30°C ~ 85°C (-22°F ~ 185°F)			
	Low Temp. Type	-40°C ~ 85°C (-40°F ~ 185°F)			
LCD Operating Temperature		-30°C ~ 85°C (-22°F ~ 185°F)			
Ambient Temperature Of Explosion proof	T5	-40°C ~ 60°C (-40°F ~ 140°F)			
	T6	-40°C ~ 40°C (-40°F ~ 104°F)			
Linearity		±0.5% F.S.			
Hysteresis		±0.5% F.S.			
Sensitivity		±0.2% F.S			
Repeatability		±0.3% F.S.			
Flow Capacity		70 LPM (Sup.=0.14 MPa)			
Air Consumption		Below 2 LPM (Sup.=0.14 MPa @ idle)			
Output Characteristic		Linear, Quick Open, EQ%, User Set (16 points)			
Vibration		No Resonance up to 100Hz @ 6G			
Humidity		5-95% RH @ 40°C			
Communication (Option)		HART Communication (Rev. 7)			
Feedback Signal (Option)		4~20mA (DC 9~28V)			
Weight		2 Kg (4.4 lb)		5.1 Kg (11.2 lb)	
Painting		Epoxy Polyester Powder Coating		-	



Tested under ambient temperature of 20°C, absolute pressure of 760mmHg, and humidity of 65%.
Please contact Young Tech Co., Ltd for detailed testing specification.

2.5.2 YT-3301 Specification

Model		YT-3301 / 3302	
Housing Material		Aluminum Die-casting	
Motion Type		Linear	Rotary
Acting Type		Single / Double	
Input Signal		4~20mA DC	
Minimum Current Signal		3.2mA(Standard), 3.8mA(Hart Included)	
Supply Pressure		0.14 ~ 0.7 MPa (1.4 ~ 7 bar)	
Stroke		10 ~ 150 mm	0 ~ 90°
Impedance		Max. 500Ω @ 20mA DC	
Air Connection		PT, NPT, PF(G) 1/4	
Gauge Connection		PT, NPT, 1/8	
Conduit Entry		G(PF) 1/2 or NPT 1/2 or M20*1.5P	
Ingress Protection		IP66, Type 4X(FM)	
Explosion Proof		ATEX, IECEx, KCs, NEPSI: Ex ia IIC T5/T6 Gb, Ex iaD IIIC T100°C/T85°C Db, IP66 FM & CSA(Pending) : Class I, Division 1&2 Groups ABCD T5/T6 Class II, Division 1&2 Groups EFG T100°C/T85°C; Class III Class I, Zone 0, AEx ia IIC T5/T6, Ex ia IIC T5/T6 Ga; Ex tb IIIC T100°C/T85°C Db	
Operating Temperature	Sensor		-40°C ~ 120°C (-40°F ~ 248°F)
	Body	Standard	-30°C ~ 85°C (-22°F ~ 185°F)
		Low temp.	-40°C ~ 85°C (-40°F ~ 185°F)
LCD Operating Temperature		-30°C ~ 85°C (-22°F ~ 185°F)	
Ambient Temperature Of Explosion proof		T5	-40°C ~ 60°C (-40°F ~ 140°F)
		T6	-40°C ~ 40°C (-40°F ~ 104°F)
Linearity		±0.5% F.S.	
Hysteresis		±0.5% F.S.	
Sensitivity		±0.2% F.S.	
Repeatability		±0.3% F.S.	
Flow Capacity		70 LPM (Sup.=0.14 MPa)	
Air Consumption		Below 2 LPM (Sup.=0.14 MPa @ idle)	
Output Characteristic		Linear, Quick Open, EQ%, User Set (16 points)	
Vibration		No Resonance up to 100Hz @ 6G	
Humidity		5-95% RH @ 40°C	
Communication (Option)		HART Communication (Rev. 7)	
Feedback Signal (Option)		4~20mA (DC 9~28V)	
Weight	Positioner		2.2 Kg (4.9 lb)
	Sensor	0.6 Kg (1.2 lb)	1.0 Kg (2.1 lb)
	Cable(5M)	0.6 Kg (1.3 lb)	
Painting		Epoxy Polyester Powder Coating	



Tested under ambient temperature of 20°C, absolute pressure of 760mmHg, and humidity of 65%.
Please contact Young Tech Co., Ltd for detailed testing specification.

2.6 Certifications

※ All certifications below are posted on YTC homepage(www.ytc.co.kr).

➤ **KCs (Korea)**

Type : Intrinsic safety

Rating : Ex ia IIC T5/T6, Ex iaD T100°C/T85°C, IP66

Certification No. : 12-KB2BO-0398X(YT-3300)

12-KB2BO-0399X(YT-3300+LS(Dry contact))

14-KB2BO-0333X(YT-3300+LS(Non-contact))

12-KB2BO-0402X(YT-3350)

12-KB2BO-0401X(YT-3350+LS(Dry contact))

14-KB2BO-0334X(YT-3350+LS(Non-contact))

14-KB2BO-0335X(YT-3303)

12-KB2BO-0400X(YT-3301)

Ambient temperature : -40 ~ +60°C (T5/T100°C), -40 ~ +40°C (T6/T85°C)

➤ **ATEX**

Type : Intrinsic safety

Rating : II 2G Ex ia IIC T5/T6 Gb, II 2D Ex ia IIIC T100°C/T85°C Db, IP6X

Certification No. : EPS 12 ATEX 1 456 X

Ambient temperature : -40 ~ +60°C (T5), -40 ~ +40°C (T6)

➤ **IECEX**

Type : Intrinsic safety

Rating : Ex II 2G Ex ia IIC T5/T6 Gb, Ex II 2D Ex ia IIIC T100°C/T85°C Db, IP6X

Certification No. : IECEX EPS 12.0017X

Ambient temperature : -40 ~ +60°C (T5/T100°C), -40 ~ +40°C (T6/T85°C)

➤ **NEPSI**

Type : Intrinsic safety

Rating : Ex ia IIC T5/T6

Certification No. : GYJ11.1599X

➤ **TRCU**

Type : Intrinsic safety

Rating : 1Ex ia IIC «T6 ... T5» Gb X, Ex ia IIIC «T85 ° C ... T100 ° C» Db X

Certification No. : RU C-KR.MIO62.B.04756

Ambient temperature : -40 ~ +60°C (T5/T100°C), -40 ~ +40°C (T6/T85°C)

➤ **FM**

Rating : Class I, Div 1, Groups ABCD

Class I, Zone 0 AEx ia IIC

Class II/III, Div 1, Groups EFG

Class I, II, III, Div 2, Groups ABCDEFG

NEMA Type 4, IP66

Certificate No.: FM16US0268X

Ambient temperature : -40 to +60°C(T5), -40 to +40°C(T6)

➤ **CSA (Pending)**

Type : Intrinsic safety

Rating : Class I, Division 1&2 Groups ABCD T5/T6

Class II, Division 1&2 Groups EFG T100°C/T85°C

Class III

Ex ia IIC T5/T6 Ga

Ex tb IIIC T100°C/T85°C Db

IP66

Certificate No.: CSA 17.nnnnnnn.X

Ambient temperature : -40 to +60°C(T5), -40 to +40°C(T6)

➤ **SIL2 (in a redundant structure up to SIL 3)**

Intended application : Safety function is defined as to move into fail-safe-position, when signal to positioner is interrupted.

Certification No. : V 460.02/15

➤ **Electromagnetic Compatibility (EMC)**

- EMC directive 2014/30/EC from April 2016

- EC Directive for CE conformity marking

2.7 Parts and Assembly

2.7.1 YT-3300 / 3350

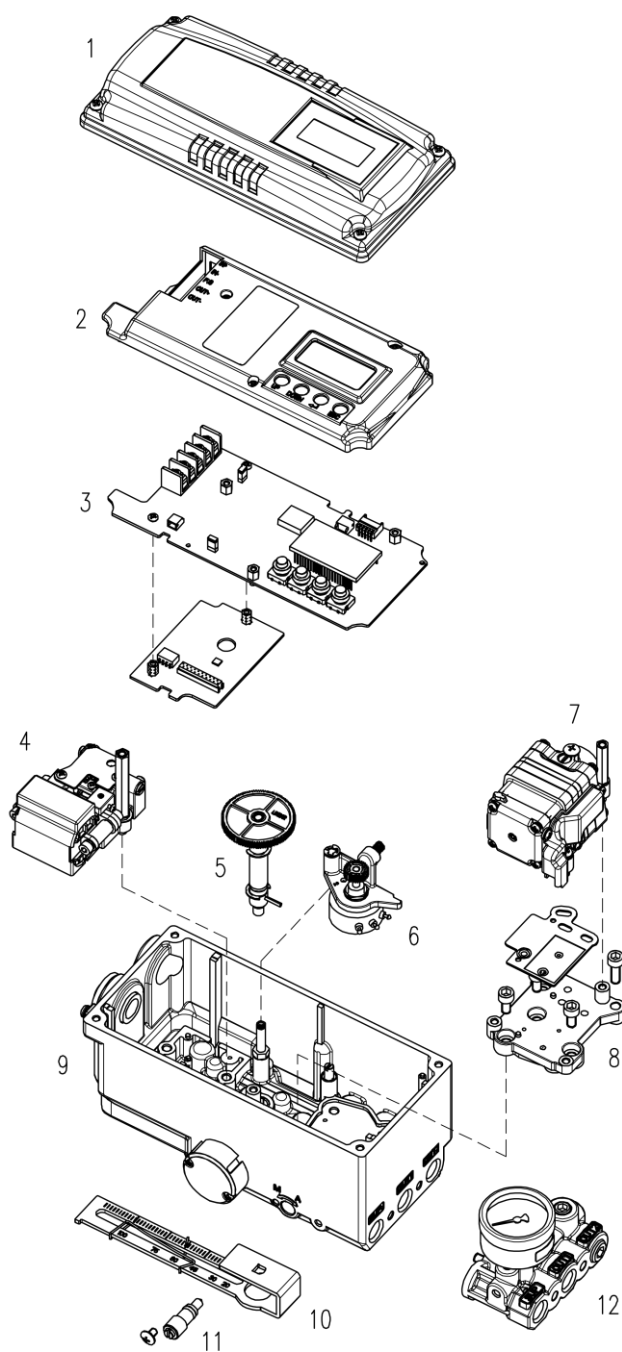


Fig. 2-1: YT-3300 / 3350 exploded view

- | | |
|------------------|------------------------|
| 1. Base Cover | 8. Pilot Block |
| 2. PCB Cover | 9. Base body |
| 3. Main PCB | 10. Feedback Lever |
| 4. Torque Motor | 11. Auto Manual Switch |
| 5. Main Shaft | 12. Gauge Block |
| 6. Potentiometer | |
| 7. Pilot | |

2.7.2 YT-3303

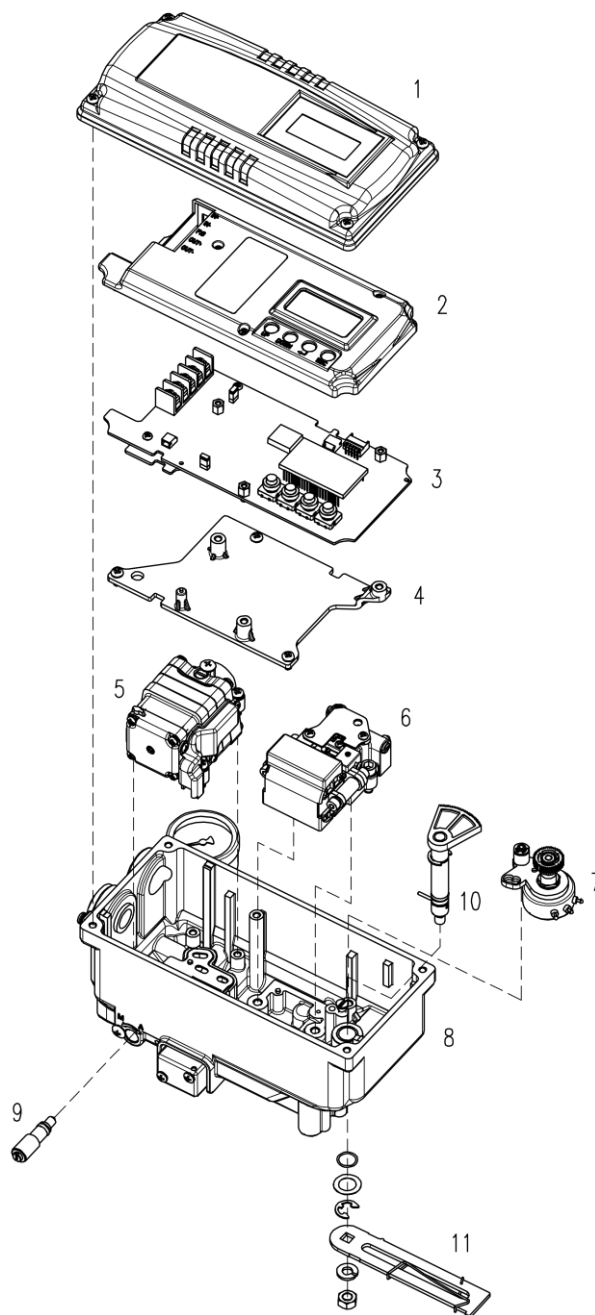


Fig. 2-2: YT-3303 exploded view

- | | |
|-----------------|--------------------------|
| 1. Base Cover | 7. Potentiometer |
| 2. PCB Cover | 8. Base body Pilot Block |
| 3. Main PCB | 9. Auto Manual Switch |
| 4. Support PCB | 10. Main Shaft |
| 5. Pilot | 11. Feedback Lever |
| 6. Torque Motor | |

2.7.3 YT-3301

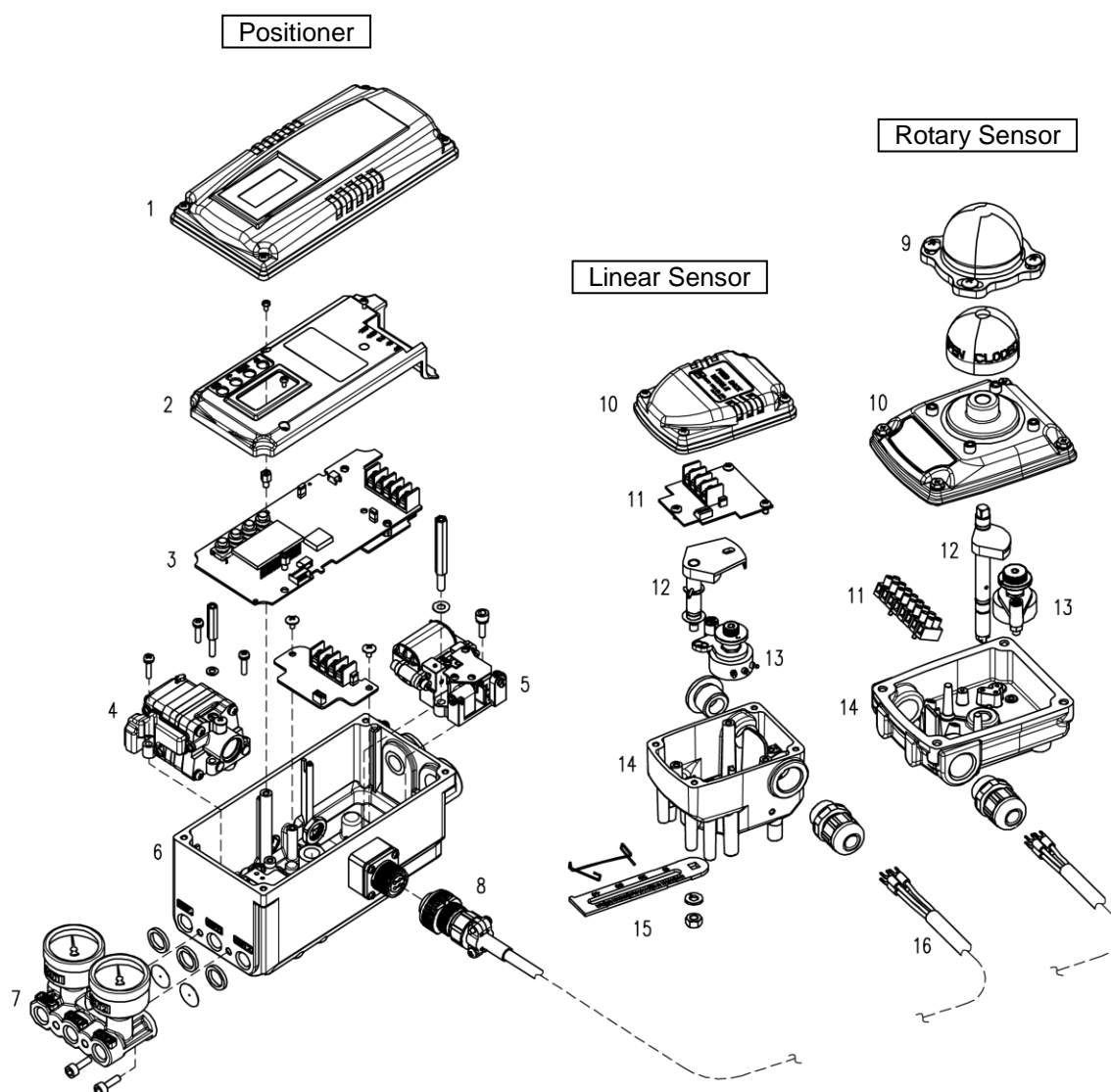


Fig. 2-3: YT-3301 exploded view

- | | |
|-------------------------------|--------------------------------------|
| 1. Base cover of Positioner | 9. Dome cover of Feedback sensor |
| 2. PCB cover of Positioner | 10. Base cover of Feedback sensor |
| 3. PCB of Positioner | 11. Terminal of Feedback sensor |
| 4. Pilot of Positioner | 12. Main shaft of Feedback sensor |
| 5. Torque motor of Positioner | 13. Potentiometer of Feedback sensor |
| 6. Body base of Positioner | 14. Base body of Feedback sensor |
| 7. Gauge block of Positioner | 15. Lever of Feedback sensor |
| 8. MS connector of Positioner | 16. Remote cable |

2.8 Product Dimension

2.8.1 YT-3300

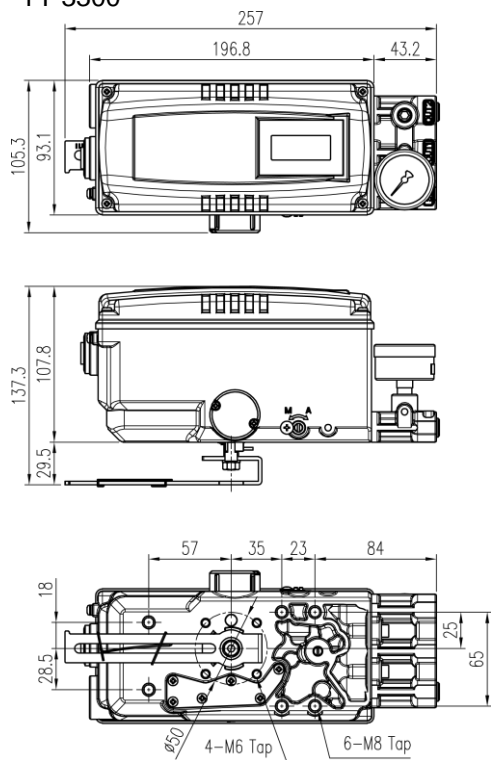


Fig. 2-4: YT-3300L (Standard Lever Type)

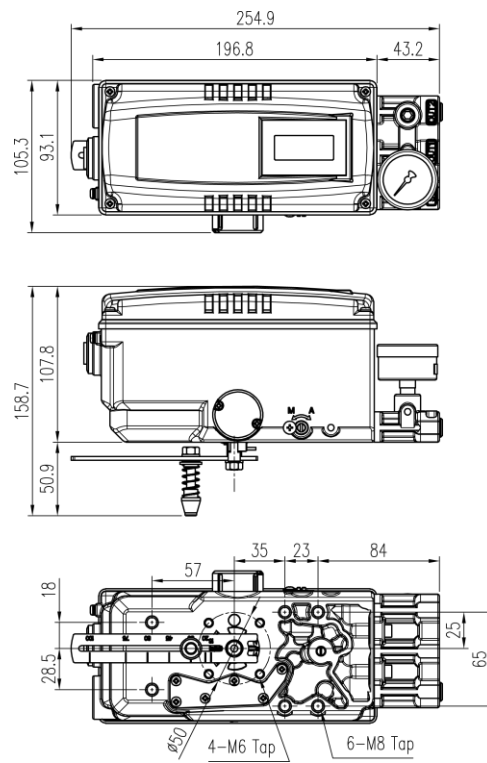


Fig. 2-5: YT-3300L (Adapter Lever Type)

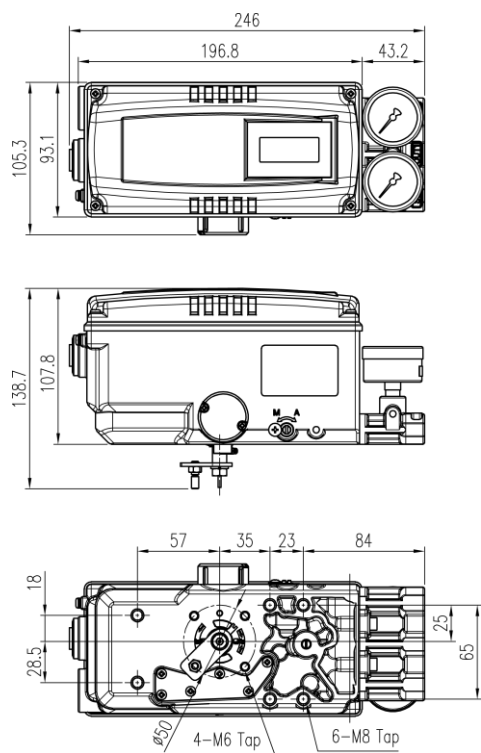


Fig. 2-6: YT-3300R (Fork lever Type)

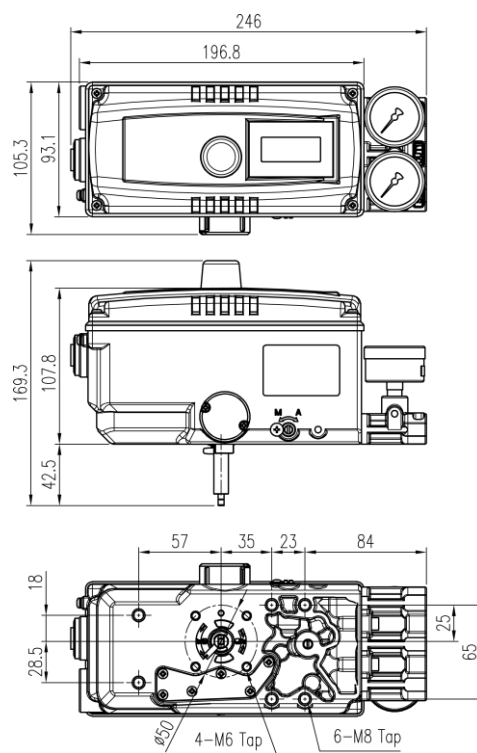


Fig. 2-7: YT-3300R+LS (Namur Type)

2.8.2 YT-3350

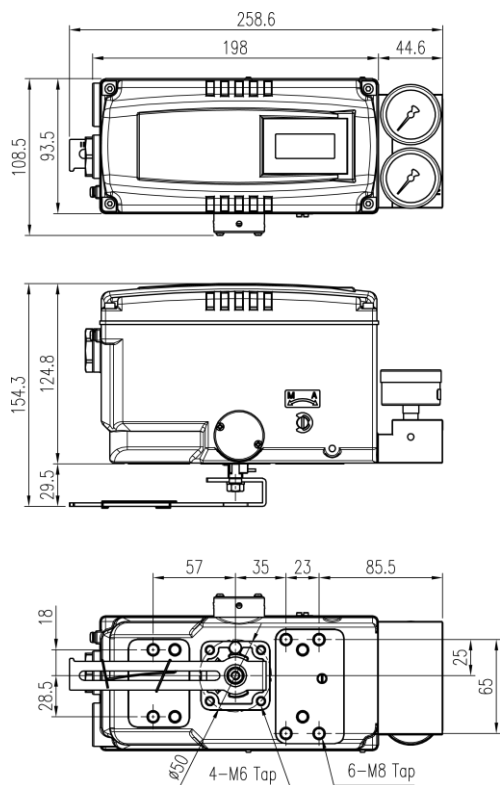


Fig. 2-8: YT-3350L (Standard Lever Type)

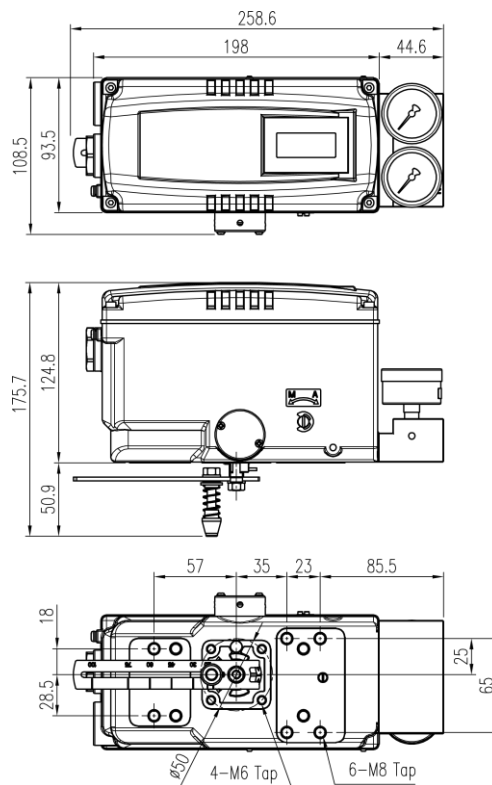


Fig. 2-9: YT-3350L (Adapter Lever Type)

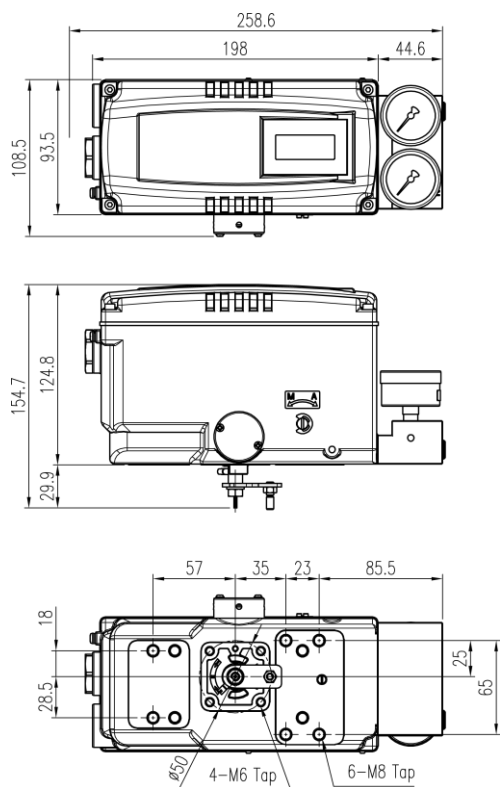


Fig. 2-10: YT-3350R (Fork lever Type)

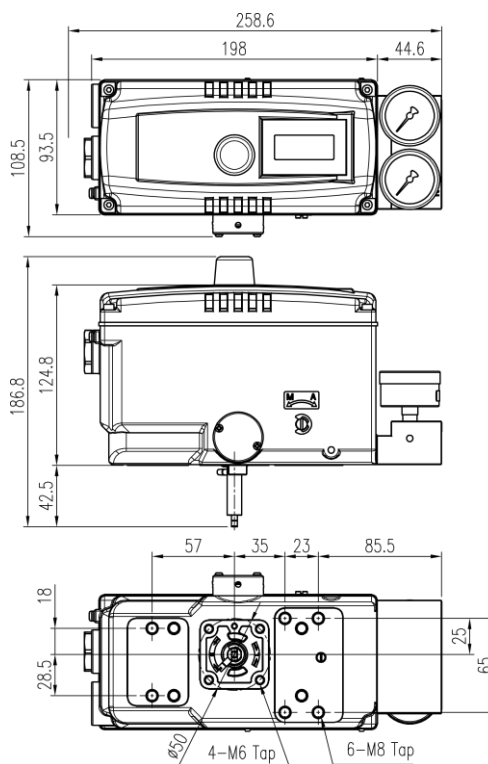


Fig. 2-11: YT-3350R+LS (Namur Type)

2.8.3 YT-3303

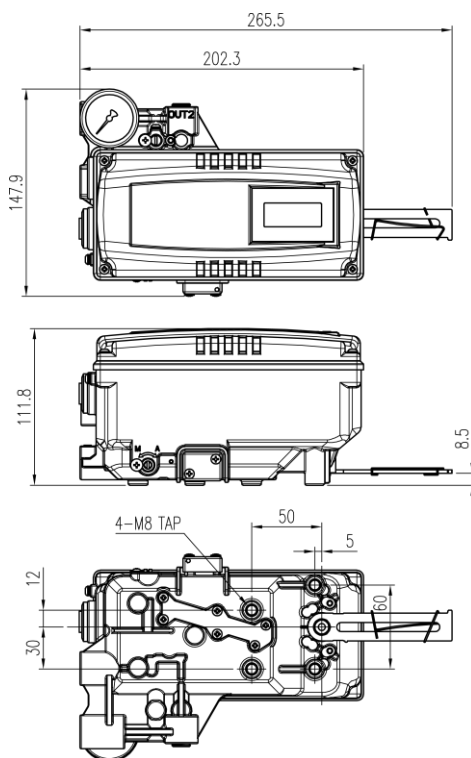


Fig. 2-12: YT-3303L

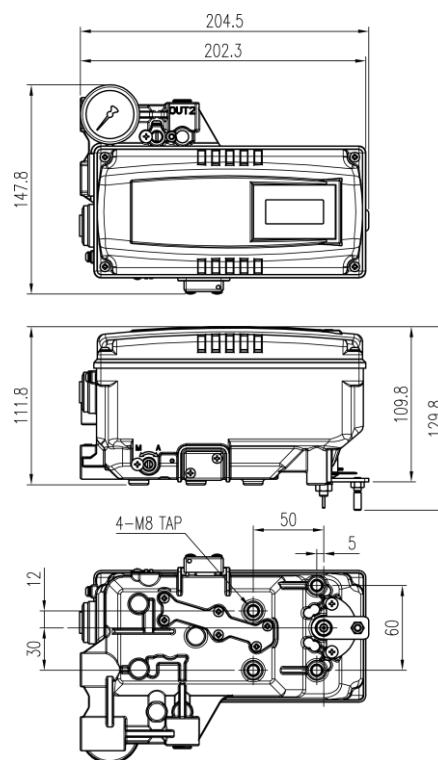


Fig. 2-13: YT-3303R (Fork lever Type)

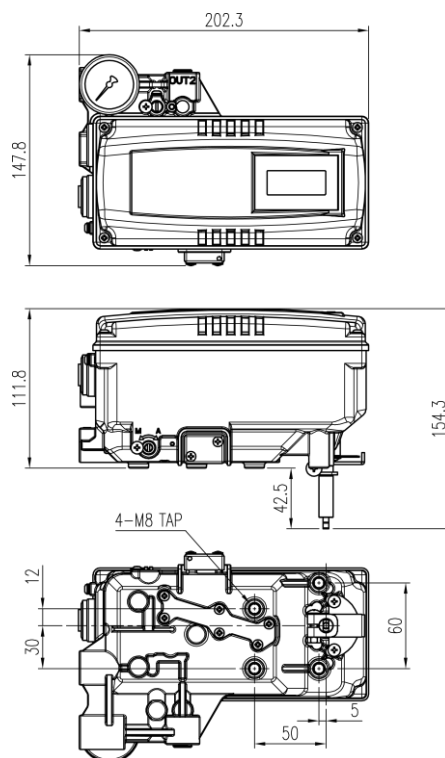


Fig. 2-14: YT-3300R+LS (Namur Type)

2.8.4 YT-3301

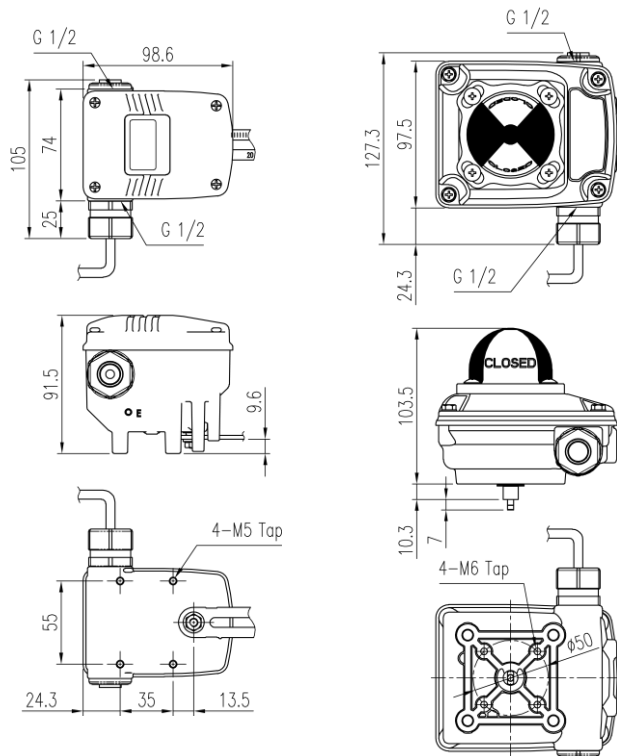


Fig. 2-15: Linear Feedback Sensor

Fig. 2-16: Rotary Feedback Sensor

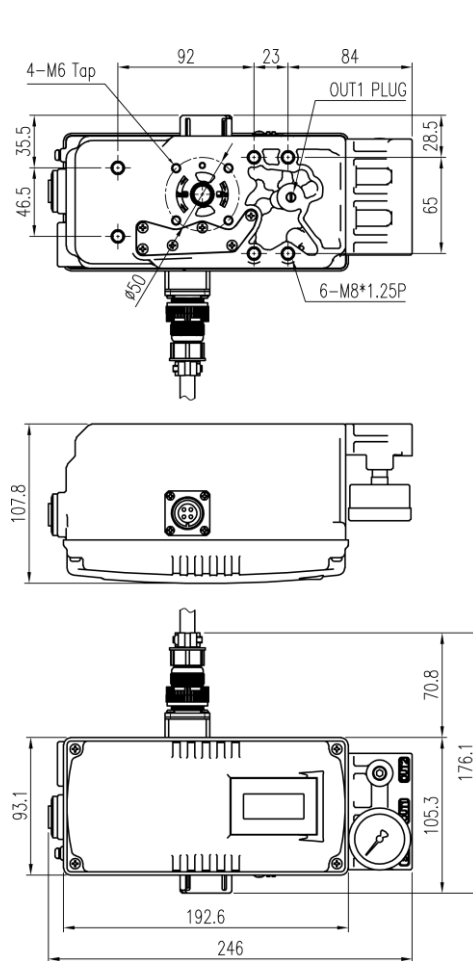


Fig. 2-17: YT-3301 Positioner

3. Installation

3.1 Safety

When installing a positioner, please ensure to read and follow safety instructions.



- Any input or supply pressures to valve, actuator, and / or to other related devices must be turned off.
- Use bypass valve or other supportive equipment to avoid entire system “shut down”.
- Ensure there is no remaining pressure in the actuator.
- ※ Installed in accordance with the National Electrical Code(NEC), ANSI/NFPA 70, or CEC Part 1 as applicable.(FM approved product)

3.2 Tools for installation

- Hex key set for hex socket cap bolts
- (+) & (-) Screw drivers
- Spanners for hexagonal-head bolts

3.3 Linear positioner Installation

Linear positioner should be installed on linear motion valves such as globe or gate type which uses spring return type diaphragm or piston actuators.

3.3.1 Linear positioner Installation of Standard lever type

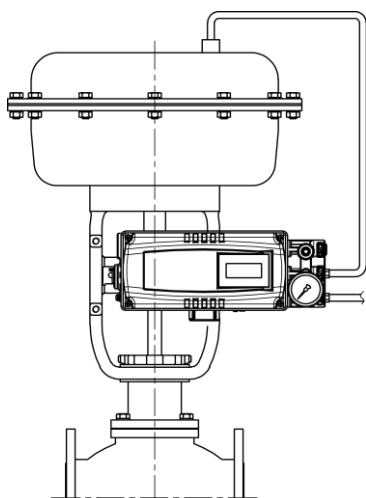


Fig. 3-1: YT-3300L / 3350L installation of standard lever type example

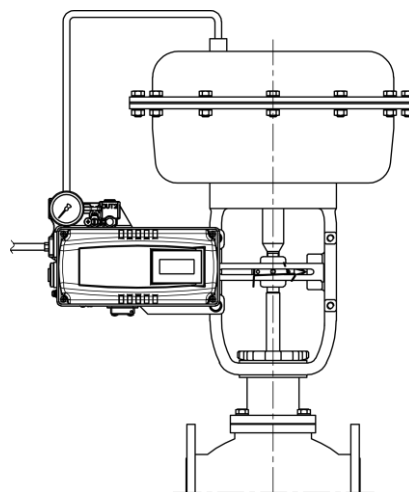


Fig. 3-2: YT-3303L installation example

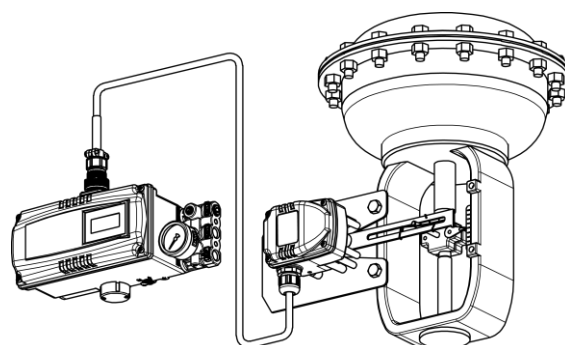


Fig. 3-3: YT-3301L installation example

Before proceeding with the installation, ensure following components are available.

- Positioner
- Linear feedback sensor (Only YT-3301L)
- Remote cable (Only YT-3301L)
- Feedback lever and lever spring
- M6 nut and spring washer (fastening feedback lever to a main shaft)
- Bracket, bolts and washers for positioner or sensor – not supplied with the positioner
- Connection bar – not supplied with the positioner

3.3.1.1 Safety

Proper bracket must be made in order to adapt the positioner on the actuator yoke.

Please consider following important points when a bracket is being designed.



- Positioner's feedback lever must be vertical to the valve stem at 50% of the valve stroke.
- The connection bar of the actuator clamp for the feedback lever should be installed in such a way that the valve stroke length coincides with the corresponding figure in "mm" marked on the feedback lever. Improper setting may cause poor linearity

3.3.1.2 Standard lever type positioner Installation Steps

1. Assemble the positioner or feedback sensor with the bracket made in previous step by fastening the bolts.

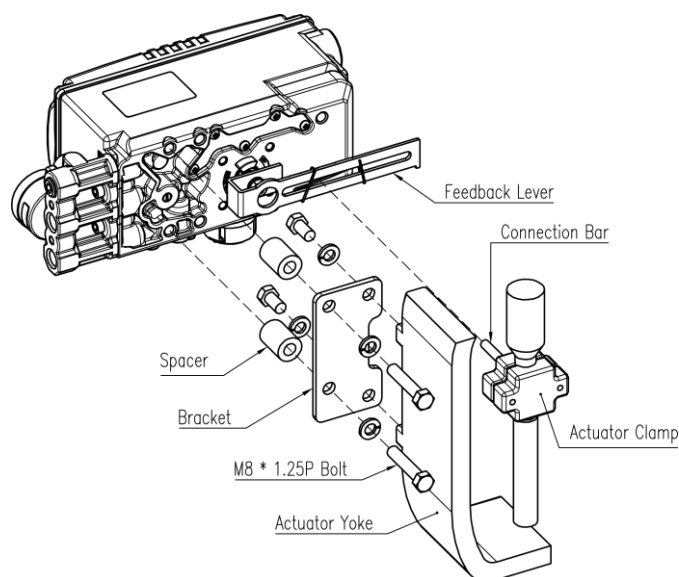


Fig. 3-4: YT-3300L / 3350L (Standard Lever Type)

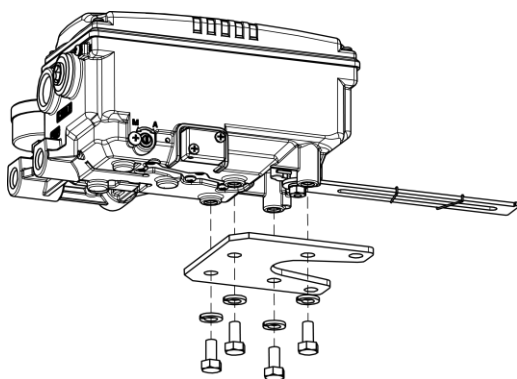


Fig. 3-5: Attaching positioner to bracket (YT-3303L)

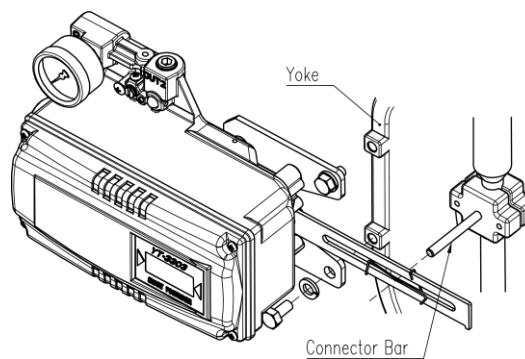


Fig. 3-6: Attaching the bracket to actuator yoke (YT-3303L / 3301L)

2. Attach the positioner (or feedback sensor) with the bracket to the actuator yoke – **DO NOT TIGHTEN THE BRACKET COMPLETELY.**
3. Connect connection bar to the actuator clamp. The hole gap on the feedback lever is 6.5mm so the connection bar's outer diameter should be less than 6mm.
4. Connect an air-filter regulator to the actuator temporarily. Supply enough air pressure to the actuator in order to position the valve stroke at 50% of the total stroke.

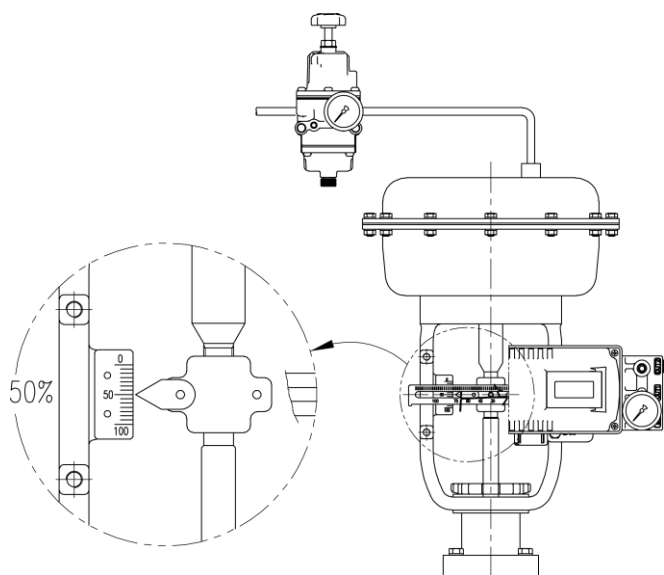


Fig. 3-7: YT-3300L / 3350L (Standard Lever Type)

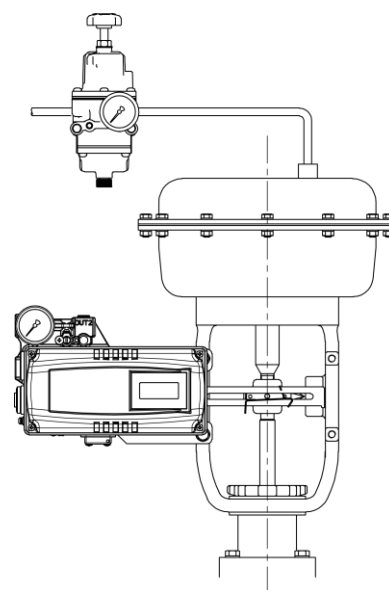


Fig. 3-8: YT-3303L / 3301L

5. Insert the connection bar between the feedback lever and lever spring. The connection bar must be located upward from the spring lever as shown below left figure. If it is located downward from the spring lever as shown below right figure, the connection bar or the spring lever will be worn out quickly because of excessive strong tension.

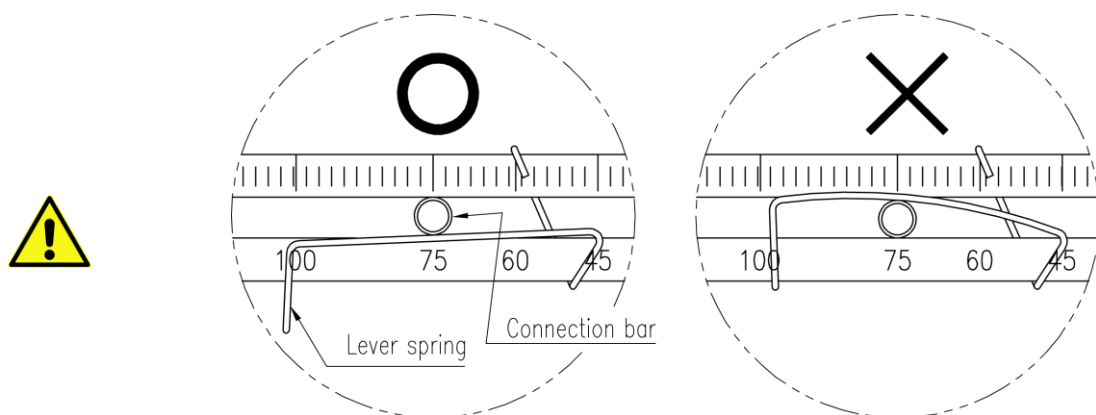


Fig. 3-9: Proper way to insert connection bar between feedback lever and lever spring

6. Check if feedback lever is vertical to the valve stem at 50% of the valve stroke. If it is not vertical, adjust the bracket or the connection bar to make vertical. Improper installation may cause poor linearity.

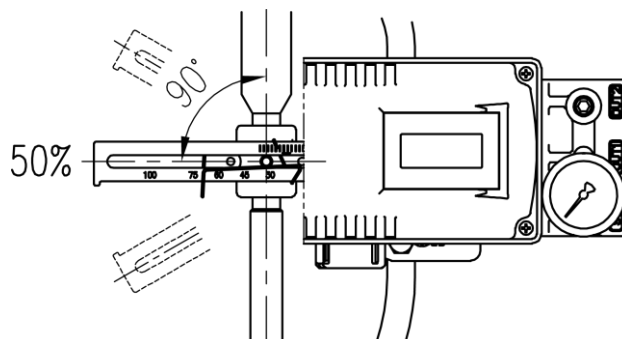


Fig. 3-10: YT-3300L / 3350L Feedback lever and valve stem

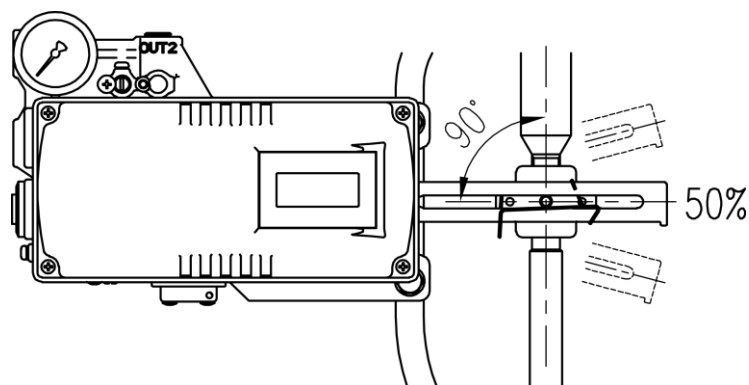
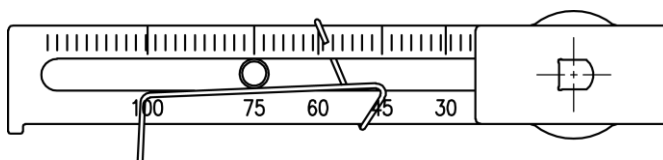


Fig. 3-11: YT-3303L / 3301L Feedback lever and valve stem

7. Check the valve stroke. The stroke numbers are engraved on the feedback lever of the positioner. Position the connection bar at the number on the feedback lever which corresponds with the desired valve stroke. To adjust, move the bracket, the connection bar or both.

※ The effective linear lever angle of YT-3300L / 3350L is 60 degree and it of YT-3303L / 3301L is 30 degree.

Stroke : 75mm



Stroke : 45mm

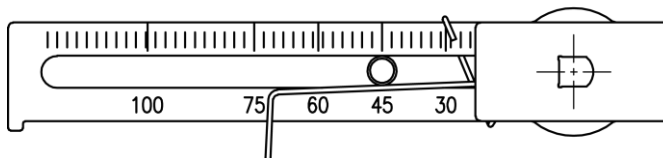
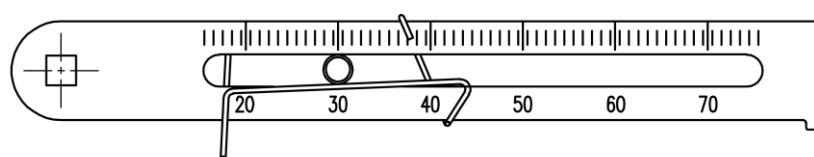
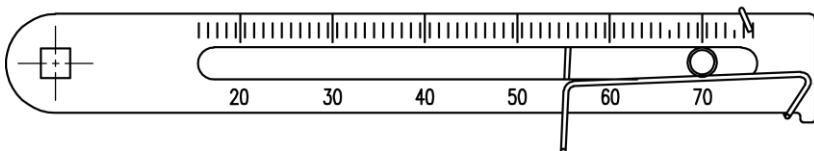


Fig. 3-12: YT-3300L / 3350L Feedback lever and location of the connection bar



Stroke : 30mm



Stroke : 70mm

Fig. 3-13: YT-3303L / 3301L Feedback lever and location of the connection bar



8. After installing the positioner, operate the valve from 0% to 100% stroke by using direct air to the actuator. On both 0% and 100%, the feedback lever should not touch the lever stopper, which is located on the backside of the positioner. If the feedback lever touches the stopper, the positioner should be installed further away from the yoke.

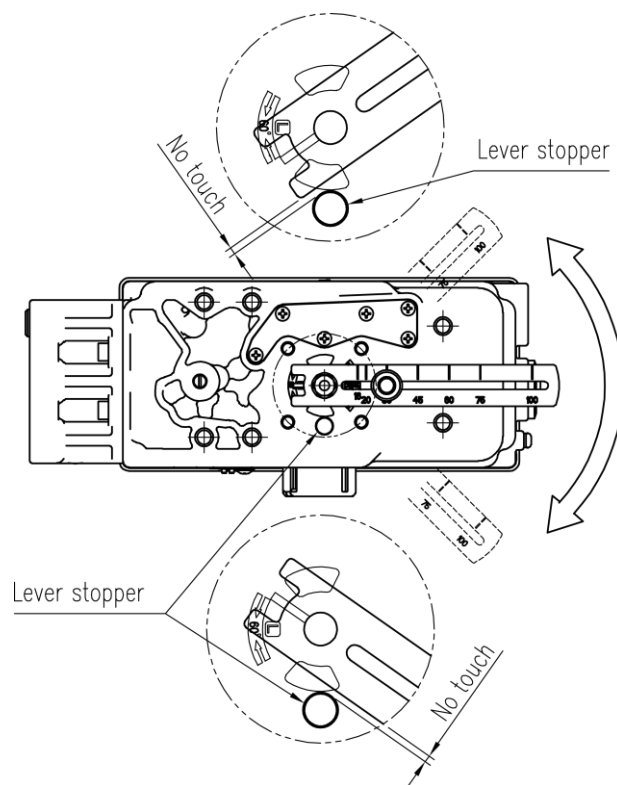


Fig. 3-14: YT-3300L / 3350L Feedback lever should not touch lever stopper on 0% ~ 100% valve stroke.

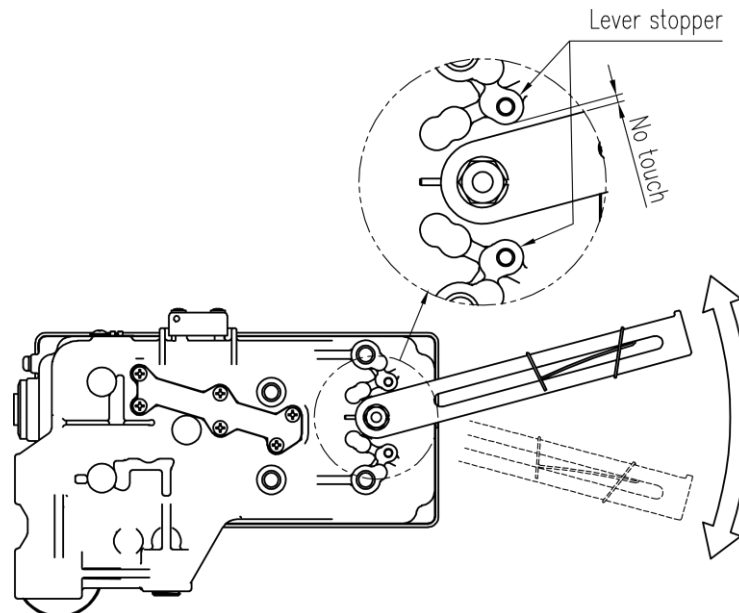


Fig. 3-15: YT-3303L / 3301L Feedback lever should not touch lever stopper on 0% ~ 100% valve stroke.

9. After the installation, tighten all of the bolts on the bracket and the connection bar.

3.3.2 YT-3300L / 3350L Installation of Adapter lever type (on tubeless actuator)

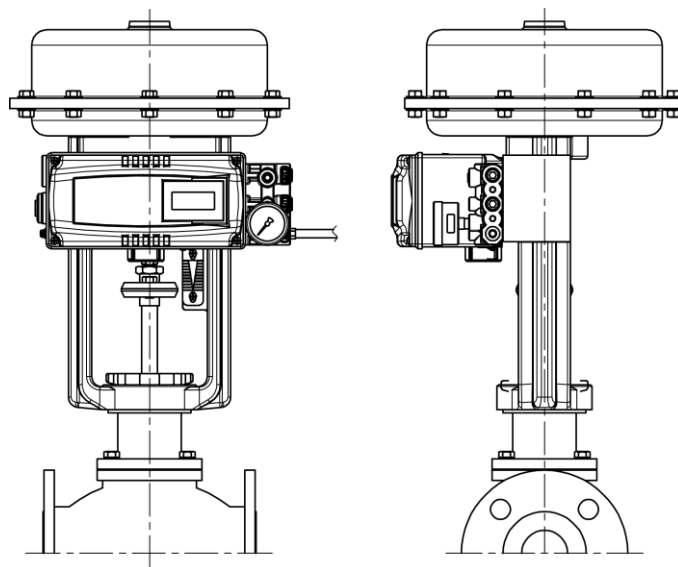


Fig. 3-16: YT-3300L / 3350L installation of adapter lever type example

Before proceeding with the installation, ensure following components are available.

- Positioner
 - Feedback lever
 - M6 nut and spring washer (fastening feedback lever to a main shaft of positioner)
 - O-ring(Connect out1 port of positioner and actuator) – not supplied with the unit
 - 1/4 plug – not supplied with the unit
 - Adapter holder – not supplied with the unit
 - 2 pcs x bolts (M8 x 1.25P) – not supplied with the unit
- ※ When using adapter lever, generally tubeless actuator which doesn't requires pipe between actuator and positioner is used. Therefore, in this section, installation method of tubeless actuator and positioner will be introduced like below.

3.3.2.1 Safety



- Positioner's feedback lever must be vertical to the valve stem at 50% of the valve stroke.
- Adapter of feedback lever should be installed in such a way that the valve stroke length coincides with the corresponding figure in "mm" marked on the feedback lever.

3.3.2.2 Adapter lever type positioner Installation Steps

1. Remove Out1 Plug(Fig. 3-18) on the bottom of the positioner. Plug up out1 port of gauge block with 1/4 plug using sealant.
2. Check the valve stroke. The stroke numbers are engraved on the feedback lever of the positioner. Position the adapter at the number on the feedback lever which corresponds with the desired valve stroke. To adjust, loosen M6 nut behind the adapter, move the adapter to correct position, and then tighten the M6 nut.

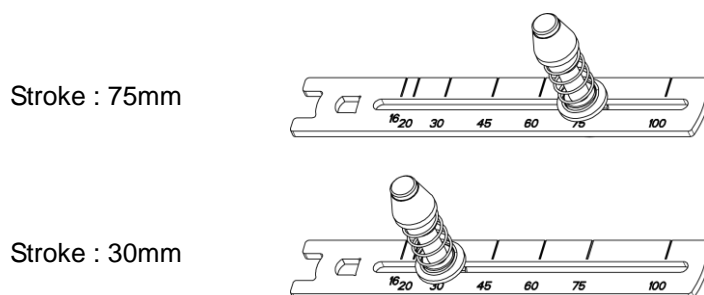


Fig. 3-17: Feedback lever and location of the connection bar

3. **Loosen Adapter holder on actuator's stem.**
4. Add O-ring between the positioner and actuator and attach the positioner to the actuator yoke tightly by fastening the bolts (M8 x 1.25P, 2 pieces).

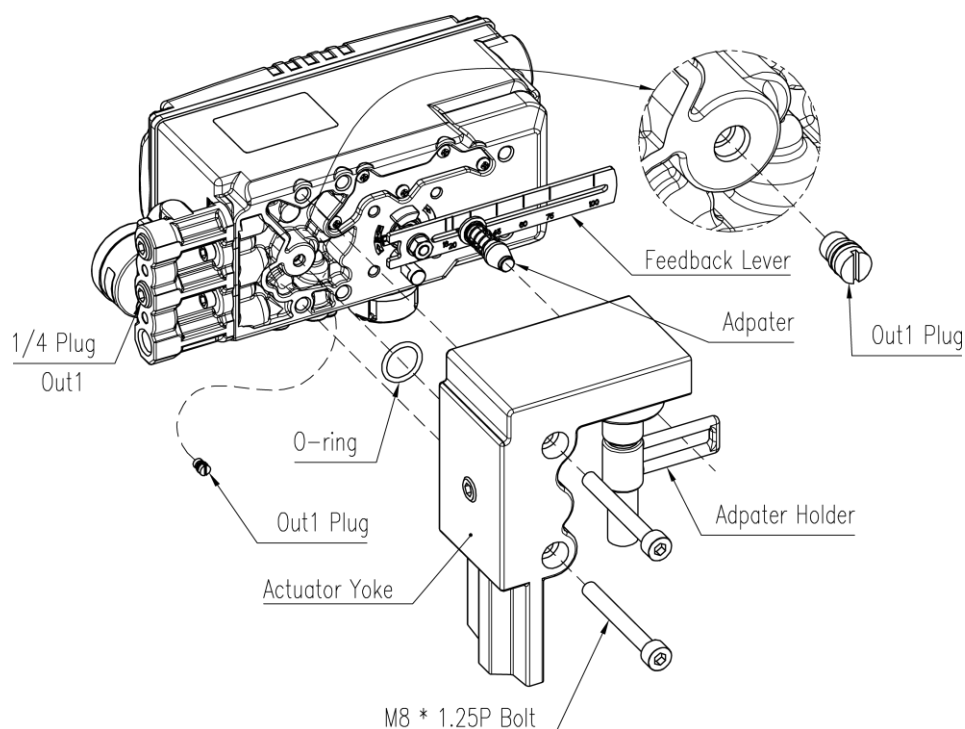


Fig. 3-18: Installing the positioner on the actuator

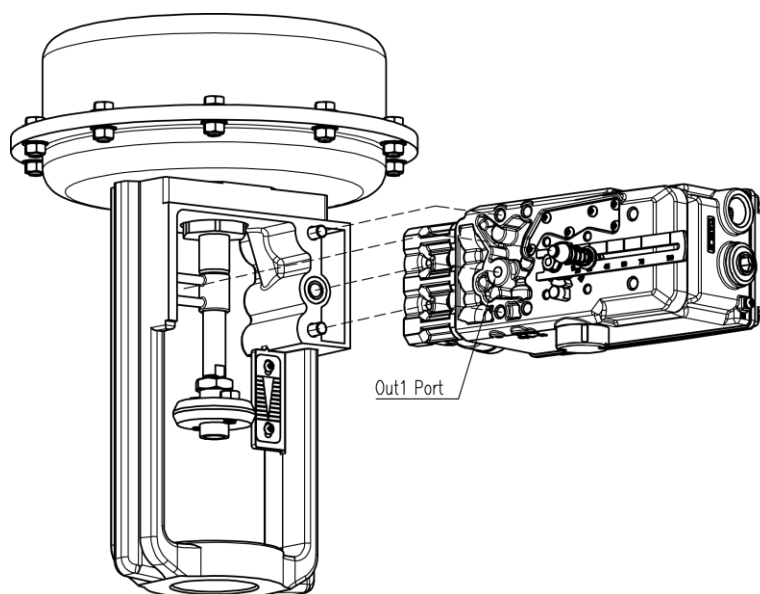


Fig. 3-19: YT-3300 / 3350L(Adapter Lever Type)

5. Connect Air-filter regulator to Supply port of the positioner.
6. Turn the Auto/Manual switch counterclockwise (toward “M”). Refer to 6.2 for more detail. Supply enough air pressure to the actuator in order to position the valve stroke at 50% of the total stroke.
7. Check if feedback lever is vertical to the valve stem at 50% of the valve stroke. If it is not vertical, adjust the adapter holder on the actuator’s stem to make vertical – **DO NOT TIGHTEN THE ADAPTER HOLDER COMPLETELY**. Improper installation may cause poor linearity.
Refer to Fig 3-10.
8. After installing the positioner, operate the valve from 0% to 100% stroke by using direct air to the actuator. On both 0% and 100%, the feedback lever should not touch the lever stopper, which is located on the backside of the positioner. If the feedback lever touches the stopper, the adapter holder should be moved or the adapter of feedback lever should be moved further away from the main shaft of the positioner.
Refer to Fig 3-14.
9. After the installation, tighten the adapter holder. And Turn the Auto/Manual switch clockwise (toward “M”) tightly. Refer to 6.2 for more detail.



3.4 Rotary positioner Installation

Rotary positioner should be installed on rotary motion valve such as ball or butterfly type which uses rack and pinion, scotch yoke or other type of actuators which its stem rotates 90 degrees. Before proceeding with the installation, ensure following components are available.

3.4.1 YT-3300R / 3350R Components

- Positioner
- Fork lever (Only Fork lever type)
- Rotary bracket set (2 piece) → The upper brackets of fork lever type and Namur type are different.
- 4 pcs x hexagonal headed bolts (M8 x 1.25P) → Fork lever type
- 4 pcs x M8 plate washers → Fork lever type
- 4 pcs x wrench headed bolts (M6 x 1P x 10L) → Namur type
- 4 pcs x wrench headed bolts (M6 x 1P x 15L)
- 4 pcs x M6 nuts
- 4 pcs x M6 spring washers
- Bolts and washers to attach bracket to actuator – not supplied with the positioner

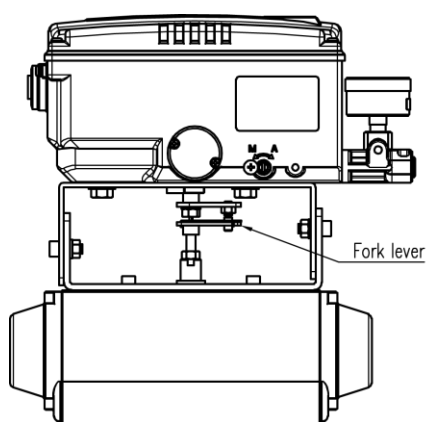


Fig. 3-20: YT-3300R / 3350R Fork lever type

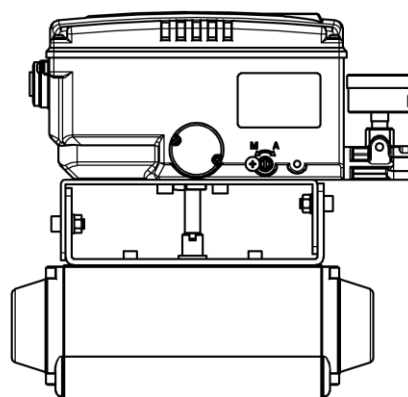


Fig. 3-21: YT-3300R / 3350R Namur type

3.4.2 YT-3303R Components

- Positioner
- Fork lever (Only Fork lever type)
- Rotary bracket set (2 piece)
- 4 pcs x hexagonal headed bolts (M8 x 1.25P)
- 4 pcs x M8 plate washers
- 4 pcs x wrench headed bolts (M6 x 1P x 15L)
- 4 pcs x M6 nuts
- 4 pcs x M6 spring washers
- Bolts and washers to attach bracket to actuator – not supplied with the positioner

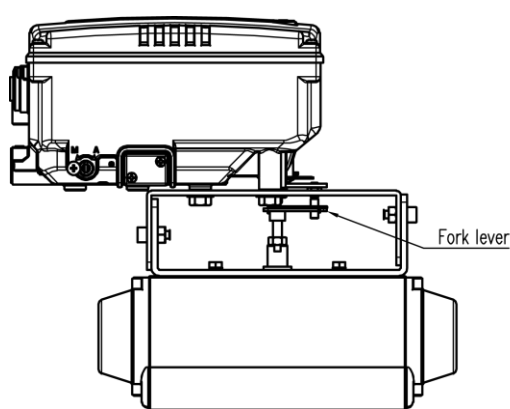


Fig. 3-22: YT-3303R Fork lever type

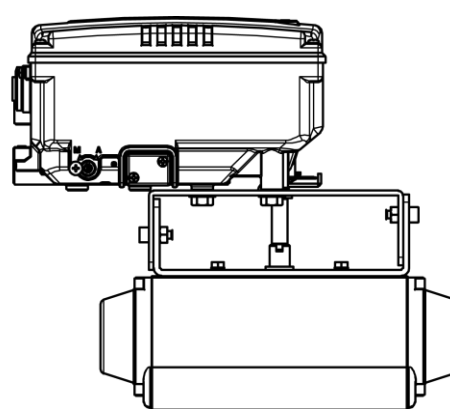


Fig. 3-23: YT-3303R Namur type

3.4.3 YT-3301R / 3302R remote sensor components

- Rotary feedback sensor
- Bracket for actuator stem height 20mm (1 piece)
- 4 pcs x hexagonal headed bolts (M6)
- 4 pcs x M6 spring washers
- Bolts and washers to attach bracket to actuator – not supplied with the positioner

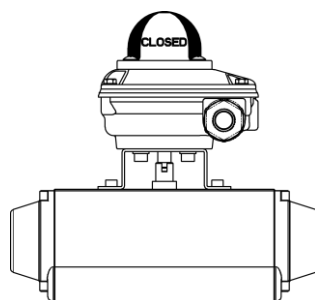


Fig. 3-24: YT-3301R Rotary feedback sensor

3.4.4 Rotary Bracket Information (Only YT-3300R / 3350R / 3303R)



The rotary bracket set (included with the positioner) contains two components. (but the upper brackets of Fork lever type and Namur type are different in case of YT-3300 / 3350). The bracket is designed to fit onto the actuator with 20mm, 30mm and 50mm stem height (H) according to VDI/VDE 3845 standard. Please refer to below table how to adjust the height of the bracket.

Actuator stem height (H)	Markings of bolt holes			
	A-L	B-L	A-R	B-R
20mm	H : 20	H : 20, 30	H : 20	H : 20, 30
30mm	H : 30	H : 20, 30	H : 30	H : 20, 30
50mm	H : 50	H : 50	H : 50	H : 50

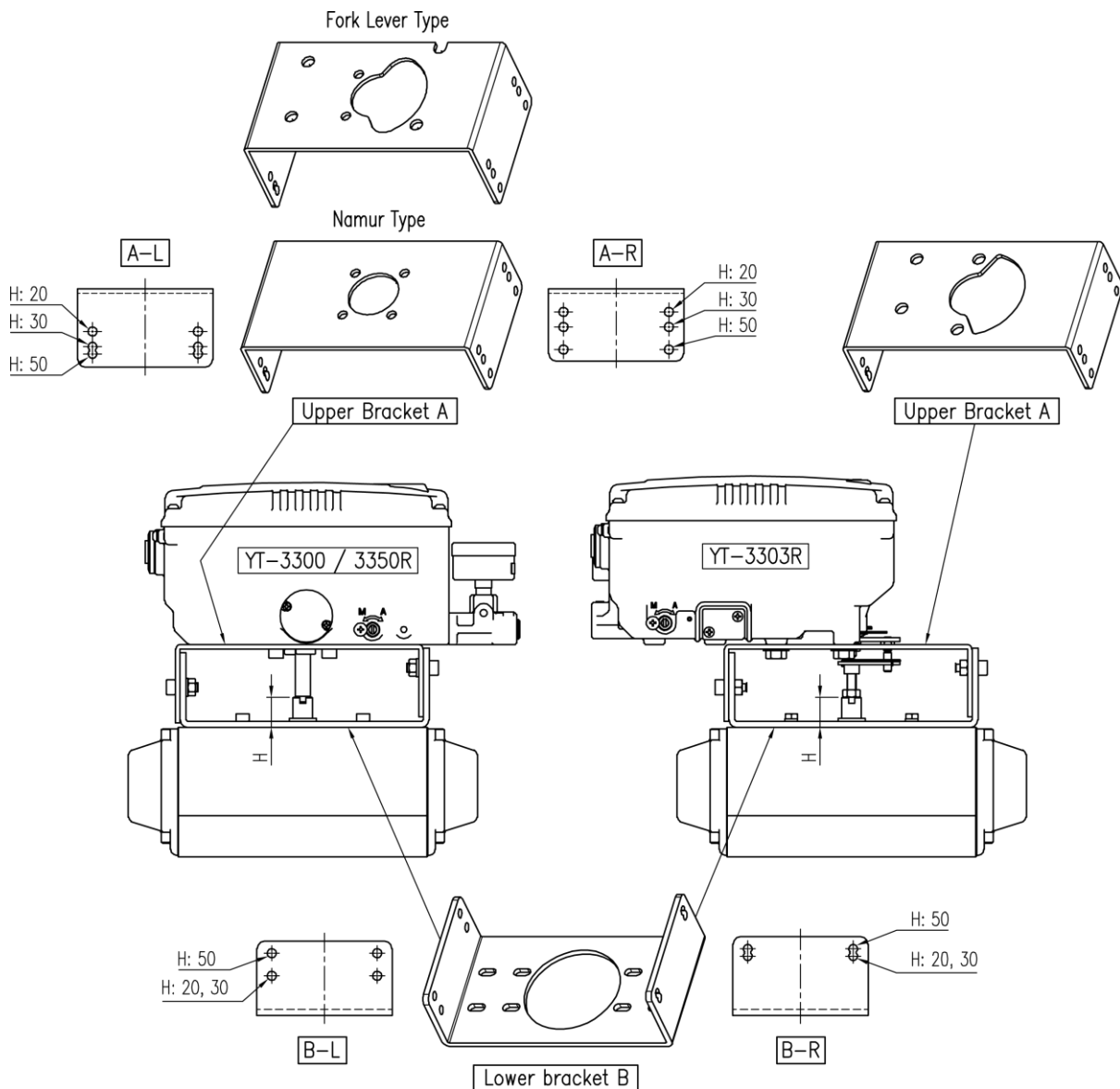


Fig. 3-25: YT-3300R / 3350R / 3303R Brackets and positioner

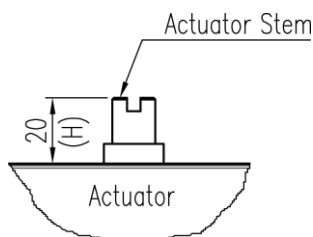


Fig. 3-26: Actuator stem Height

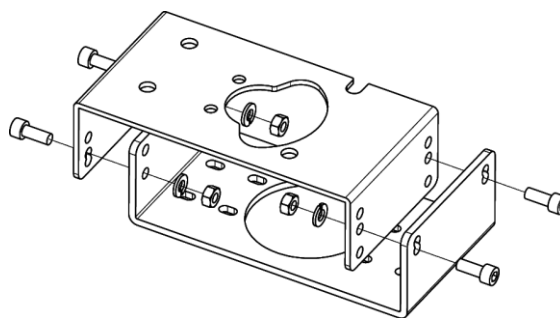


Fig. 3-27: Exploded Brackets

3.4.5 Rotary positioner Installation Steps

1. Please check the actuator's stem height and adjust the brackets by referring to the above bracket table.
2. Attached the brackets onto the actuator. It is recommended to use spring washer so the bolts will not be loosen from vibration.
3. Set rotation position of the actuator stem at 0%. For single acting actuator, it is easy to check 0% point by supplying no pressure to the actuator. For double acting actuator, check actuator stem's rotation direction – clockwise or counter-clockwise - by supplying pressure to the actuator.



4. (Only Fork lever type) Install the fork lever after setting actuator's stem at 0%. Check the actuator stem's rotation direction – clockwise or counter-clockwise.

Installation angle of the fork lever should be 45 to the longitudinal direction of the actuator.

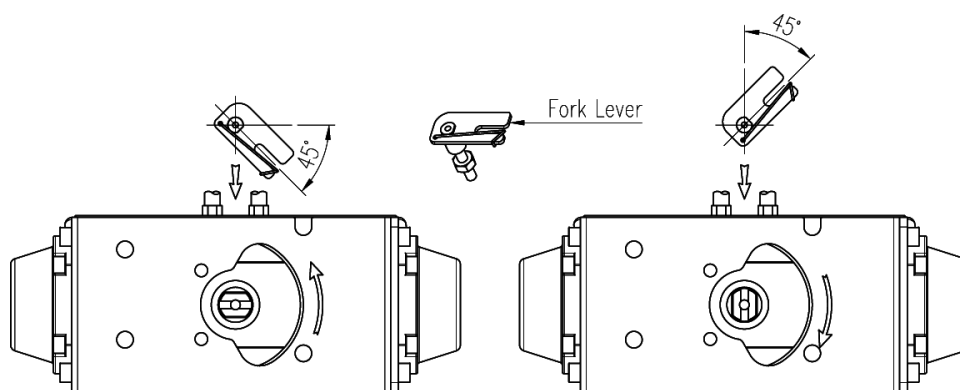


Fig. 3-28: Counter-clockwise and clockwise rotation.



5. (Only Fork lever type) After setting fork lever position, fasten lock nuts which are located on the bottom of the fork lever. Ensure to set the gap between the bottom of upper bracket and the top of the fork lever within **6~11mm**.

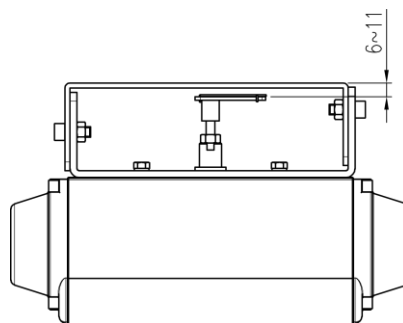


Fig. 3-29: Height to the bracket (fork lever type)



6. Attach the positioner to the bracket. *<Only fork lever type of YT-3300R / 3350R / 3303R: Fix the clamping pin (5mm Dia.) into the fork lever slot and insert center pin (2mm Dia.) of the main shaft of the positioner into the hole of center of the fork lever. The clamping pin will be locked to the fork lever spring.>* Setting alignment of center of main shaft of the positioner and center of the actuator's stem is very important. Poor alignment of the main shaft and the actuator's stem decreases the positioner's durability due to unnecessary forces on the main shaft.

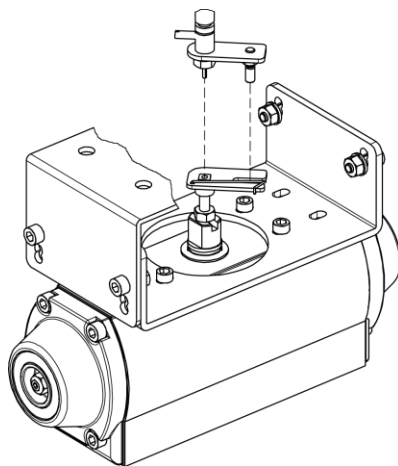


Fig. 3-30: Main shaft center alignment (Fork lever)

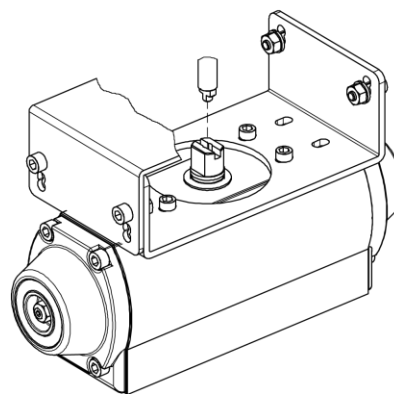


Fig. 3-31: Main shaft center alignment (Namur)

7. Tighten the positioner and the bracket with bolts **after checking the positioner's position.**

4. Connection - Air

4.1 Safety

- Supply pressure should be clean and dry air – avoiding moisture, oil or dust.
- Always recommended to use air filter regulator (i.e. YT-200 series).
- Young Tech Co., Ltd **has not tested positioner's operation with any other gases other than clean air. Please contact Young Tech Co., Ltd for any questions.**

4.2 Supply Pressure Condition



- Dry air with at least 10°C lower than ambient temperature.
- Avoid from dusty air. Use 5 micron or smaller filter.
- Avoid oil.
- Comply with ISO 8573-1 or ISA 7.0.01.
- Supply pressure range is 0.14 ~0.7 MPa (1.4 ~ 7 bar)
- Set air filter regulator's pressure level 10% higher than actuator's spring range pressure.

4.3 Piping Condition



- Ensure inside of pipe is clean of obstructions.
- Do not use pipeline that is squeezed or shows any type of damages.
- Pipeline should have more than 6mm of inner diameter (10mm outer diameter) to maintain flow rate.
- The length of pipeline system should not be extremely long. Longer pipeline system may affect flow rate due to the friction inside of the pipeline.

4.4 Connection – Piping with actuator

4.4.1 Single acting actuator

Single acting type positioner is set to use only OUT1 port. OUT1 port of positioner should be connected with supply port of actuator when using spring return actuator of single acting type.

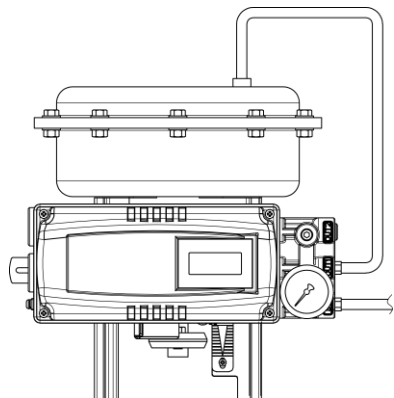


Fig. 4-1: Single acting linear actuator
(YT-3300L / 3350L / 3303L)

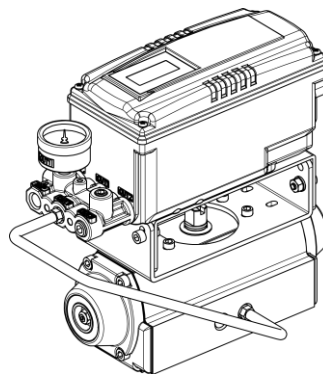


Fig. 4-2: Single acting rotary actuator
(YT-3300R / 3350R / 3303R)

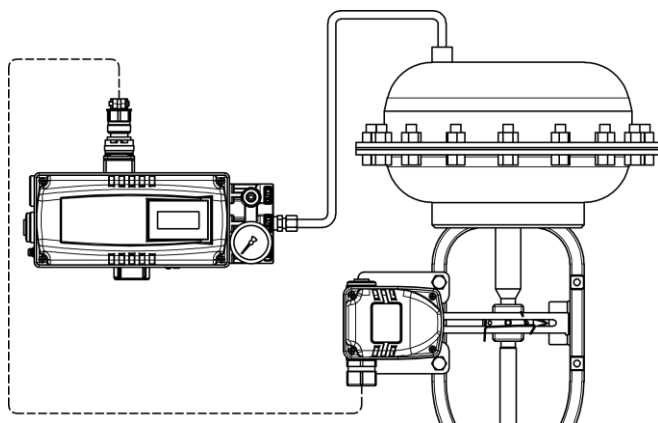


Fig. 4-3: Single acting linear actuator (YT-3301L)

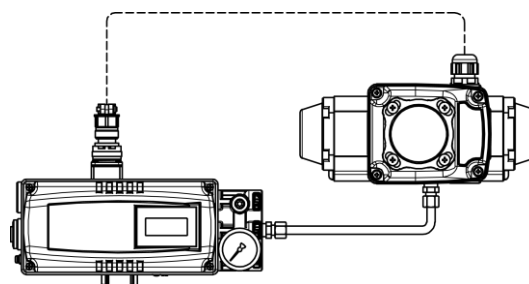


Fig. 4-4: Single acting rotary actuator (YT-3301R)

4.4.2 Double acting actuator

Double acting type positioner is set to use OUT1 and OUT2 port. As input signal increases, the supply pressure will be supplied through OUT1 port.

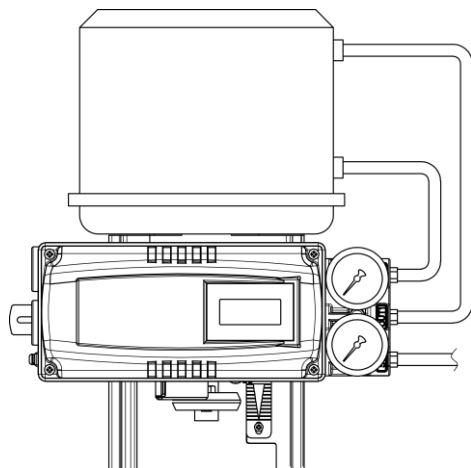


Fig. 4-5: Double acting linear actuator
(YT-3300L / 3350L / 3303L)

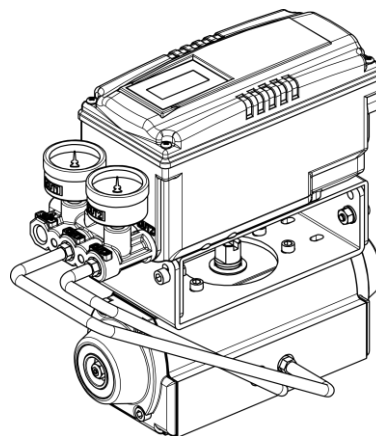


Fig. 4-6: Double acting rotary actuator
(YT-3300R / 3350R / 3303R)

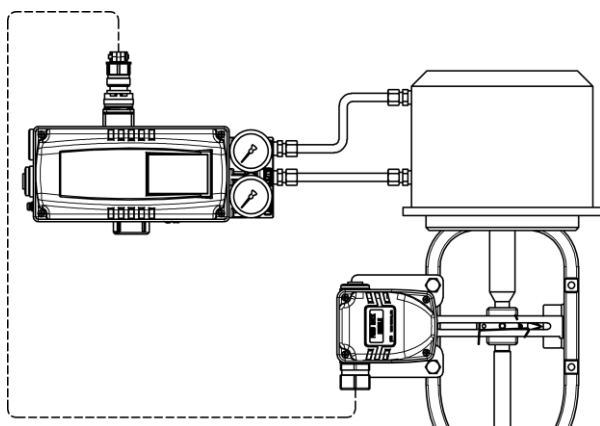


Fig. 4-7: Double acting linear actuator (YT-3301L)

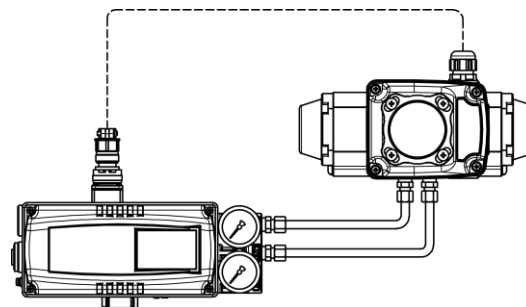


Fig. 4-8: Double acting rotary actuator (YT-3301R)

5. Connection – Power

5.1 Safety



- Conduit entry connection tap is G(PF) 1/2.
- Before connecting terminal, ensure that the power is off completely.
- Please use ring terminal to protect against vibration or any other external impact.
- Positioner usually uses 4~20mA DC. Minimum ampere of input signal of standard type positioner is 3.5 mA and Hart internal type positioner's minimum ampere of input signal is 3.8 mA but maximum ampere of input signal should be 24mA or under.
- Positioner with PTM options must be supplied with **9~28V DC** separately. For mechanical limit switch option, separate **12~30V DC** must be supplied. For Proximity limit switch option, separate **8.2V DC** must be supplied.
- Positioner should be grounded.
- Please use twisted cable with conductor section are 1.25mm² and that is suitable for 600V (complying with the conductor table of NEC Article 310.) The outer diameter of the cable should be between 6.35 ~ 10mm. Use shield wire to protect against electro-magnetic field and noise.
- Please do not install the cable near high noise equipment, such as high-capacity transformer or motor.

5.2 Connection

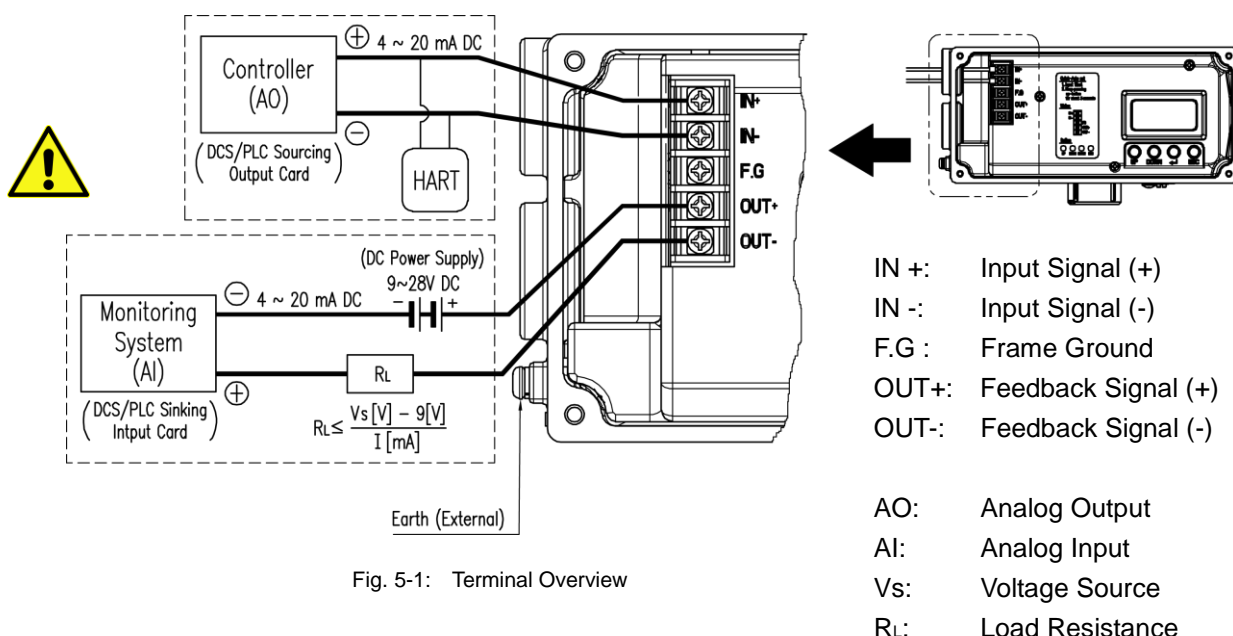


Fig. 5-1: Terminal Overview

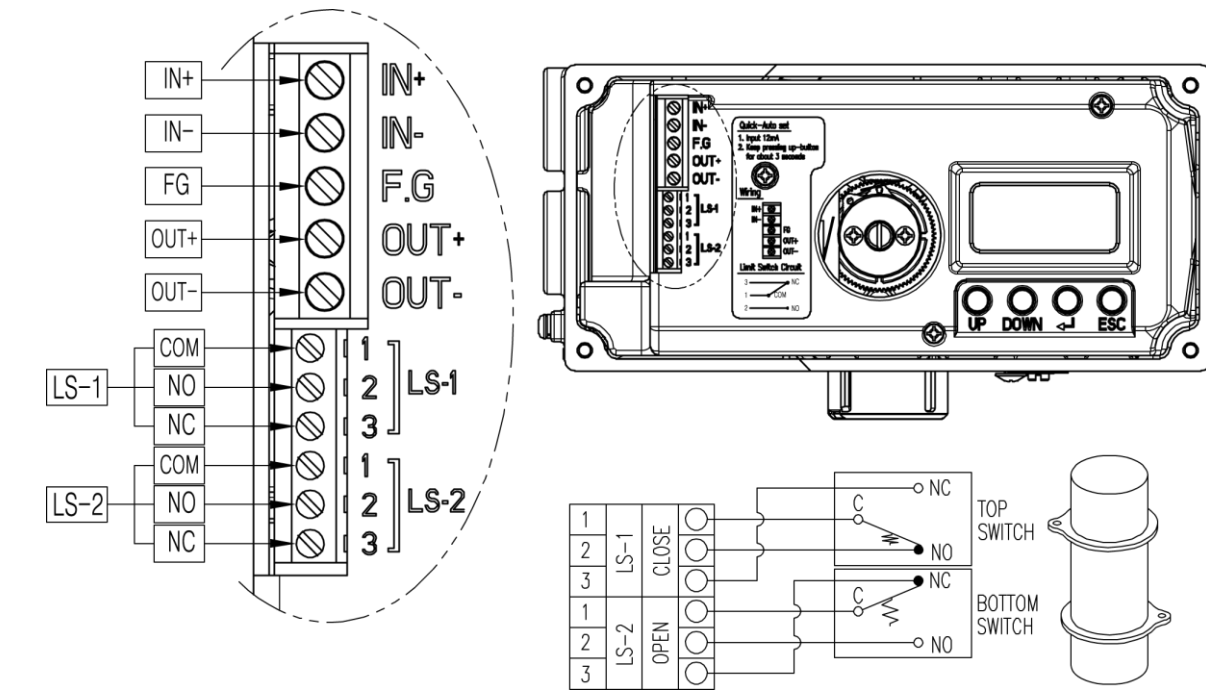


Fig. 5-2: Mechanical Switch Terminal (Only YT-3300 / 3350)

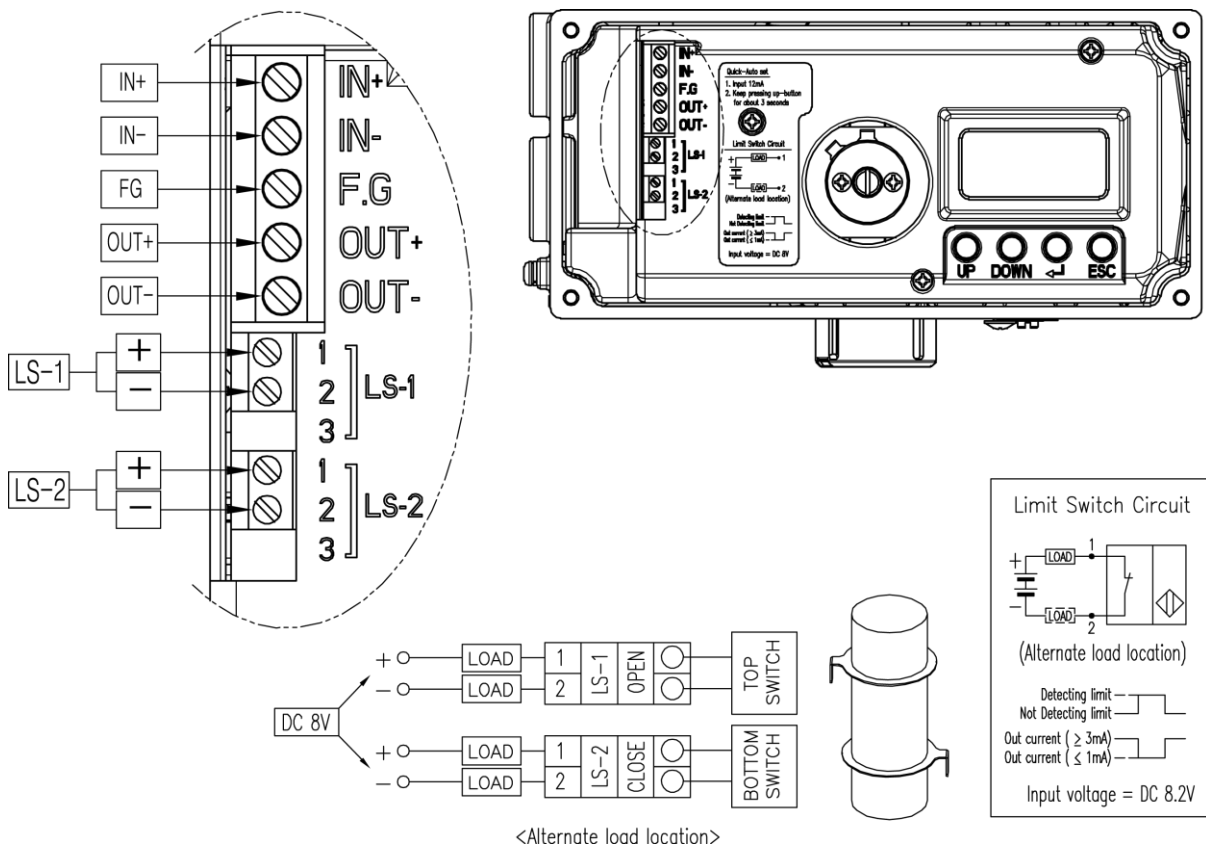


Fig. 5-3: Proximity Sensor Switch Terminal (Only YT-3300 / 3350)

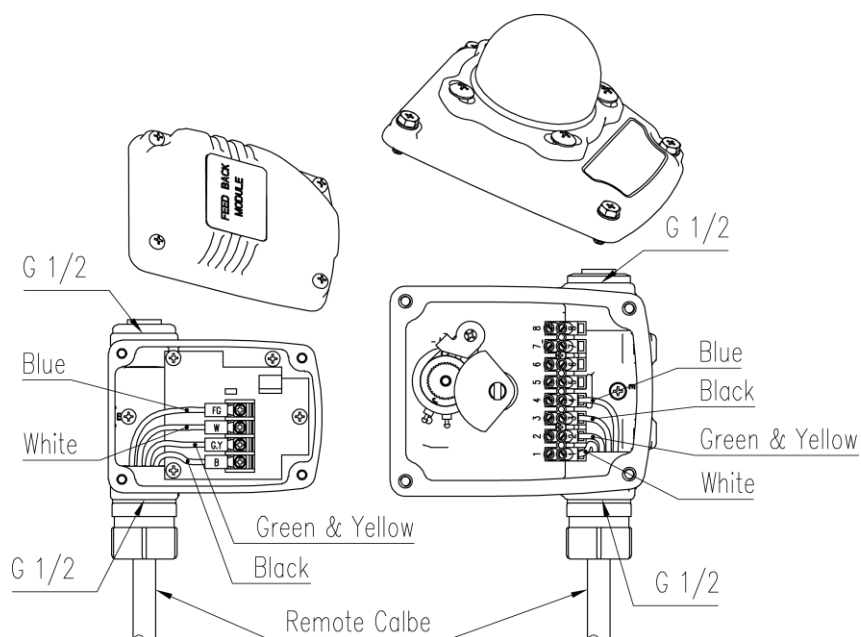


Fig. 5-4: Remote module and cables (Only YT-3301L)

5.3 Ground

1. Ground must be done before operating the positioner.
2. Open base cover and there is an internal ground "F.G" on the left hand.

An external ground bolt is located next to the conduit entry. Please make sure that the resistance is less than 100 ohm.

6. Adjustments

6.1 Limit Switch Adjustment

YT-3300 / 3350 can have limit switch option. If user wants to adjust the sensing position, please loosen bolts and adjust cam.

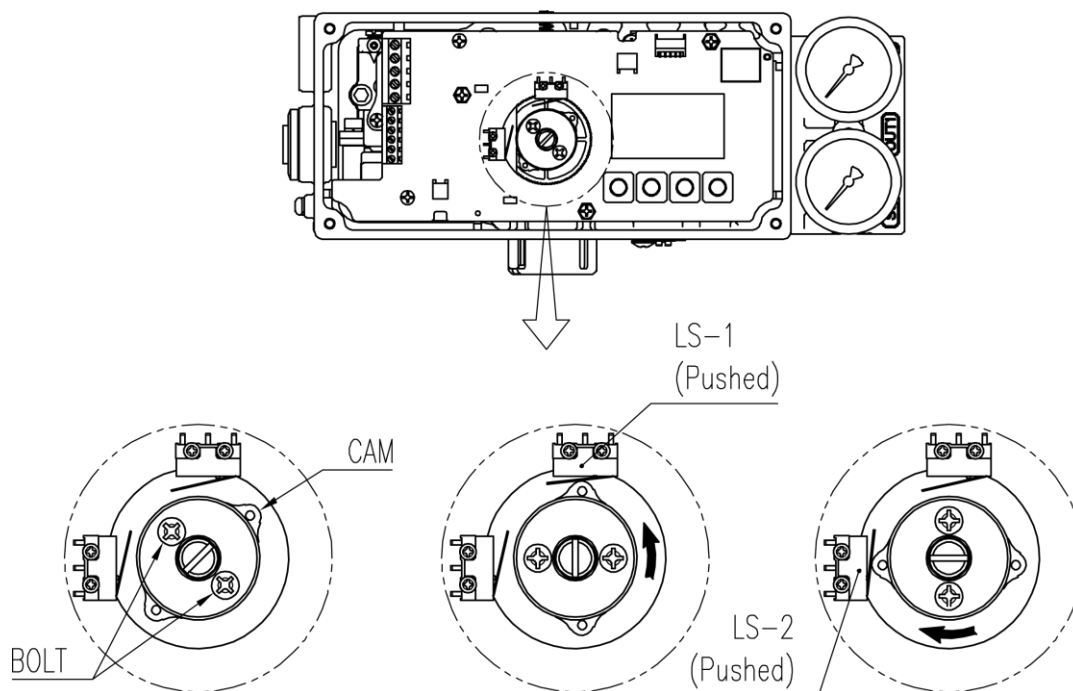


Fig. 6-1: Mechanical Type

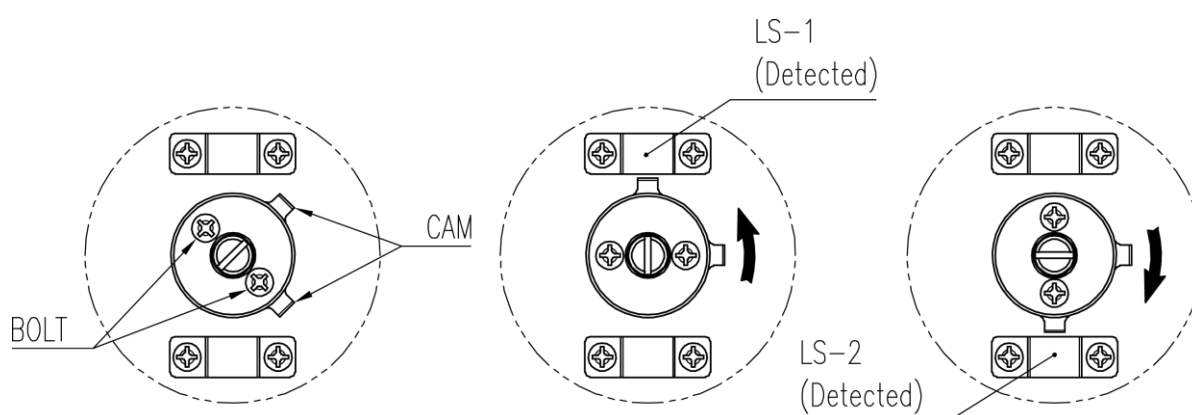


Fig. 6-2: Proximity Type

6.2 A/M switch adjustment

1. On the right hand bottom of positioner, there is A/M switch (Auto/Manual). A/M Switch allows the positioner to be functioned as by-pass. If the switch is turned clockwise (toward “A”) and it is fasten tightly, then the supply pressure will be transferred to actuator through outport by positioner control. On the other hand, if the switch is turned counter-clockwise (toward “M”), it is loosened, then the supply pressure will be directly supplied to the actuator regardless of positioner control. It is extremely important to check the allowed pressure level of the actuator when the switch is loosened.
2. Check whether the supply pressure is too high.
3. After using “Manual” function, A/M switch should be returned to “Auto”.

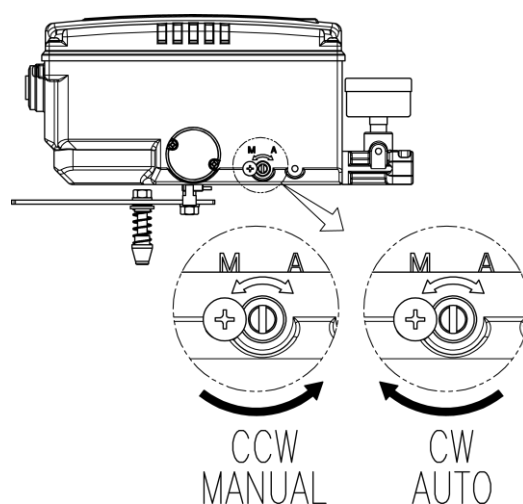


Fig. 6-3: A/M switch adjustment

6.3 Orifice Installment

Hunting can be occurred when the actuator's volume is too small. In order to prevent hunting, orifice can be used.

6.3.1 Plate type Orifice Installment (except YT-3303)

By installing the plate type orifice, the flow rate of the supply pressure to actuator can be reduced. The diameter of orifice hole is 1 mm.

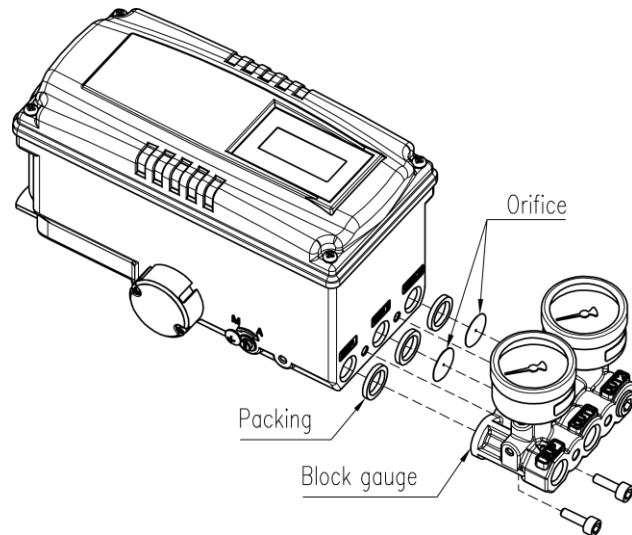


Fig. 6-4: Plate type Orifice installment

6.3.2 Variable Orifice Adjustment (Only YT-3303)

By adjusting the orifice, the flow rate of the supply pressure to actuator can be adjusted. Please use (-) driver to adjust the orifice. When slot (-) of the orifice is vertical like the below left figure, the flow rate becomes maximum. When slot (-) of the orifice is horizontal like the below right figure, the flow rate becomes minimum.

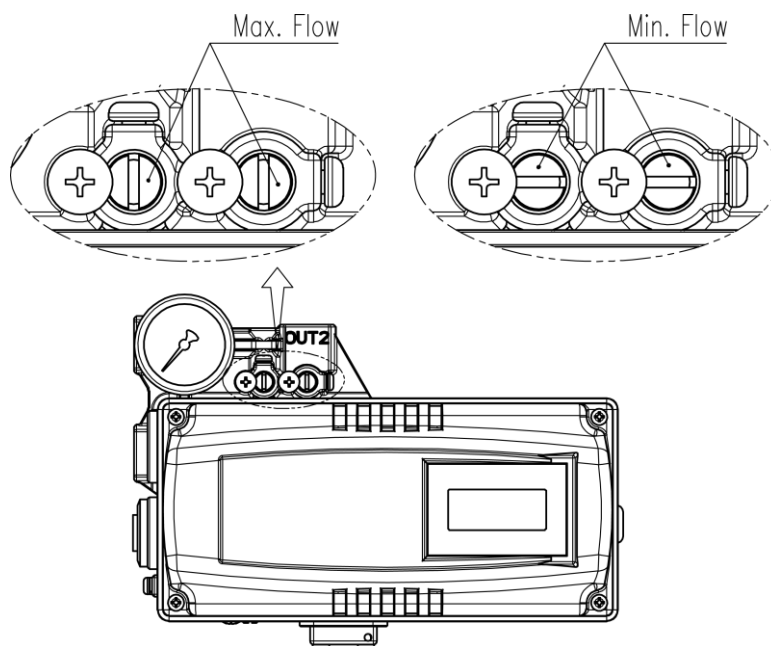


Fig. 6-5: Variable orifice adjustment

7. Optional Sub-PCB Installment

By adding sub-PCB, the positioner can have additional functions. There are 3 types of sub-PCB.

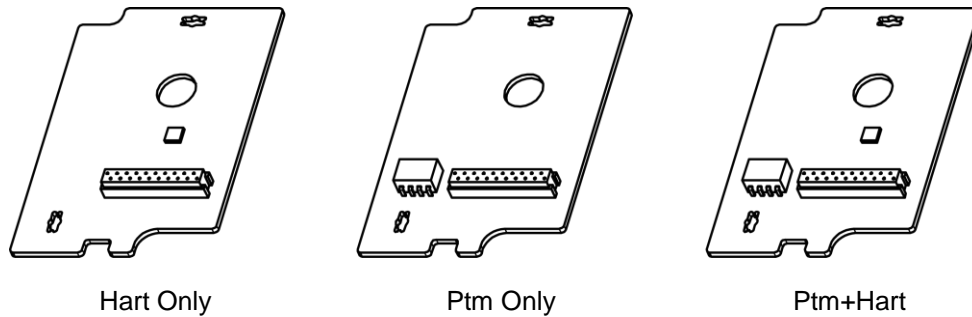


Fig. 7-1: Three types of Sub-PCB

When purchasing option sub-PCBs separately, 4 Bolts and 2 supports are supplied together with sub-PCB.)

7.1 Installation steps

1. Mount 2ea of sub-PCB support on sub-PCB with 2ea of bolt.
2. Open base cover, PCB cover. Separate the Main PCB from base body.
3. Insert connector of sub-PCB into connector of main PCB correctly.
4. Fasten sub-PCB with the rest of bolt 2ea.

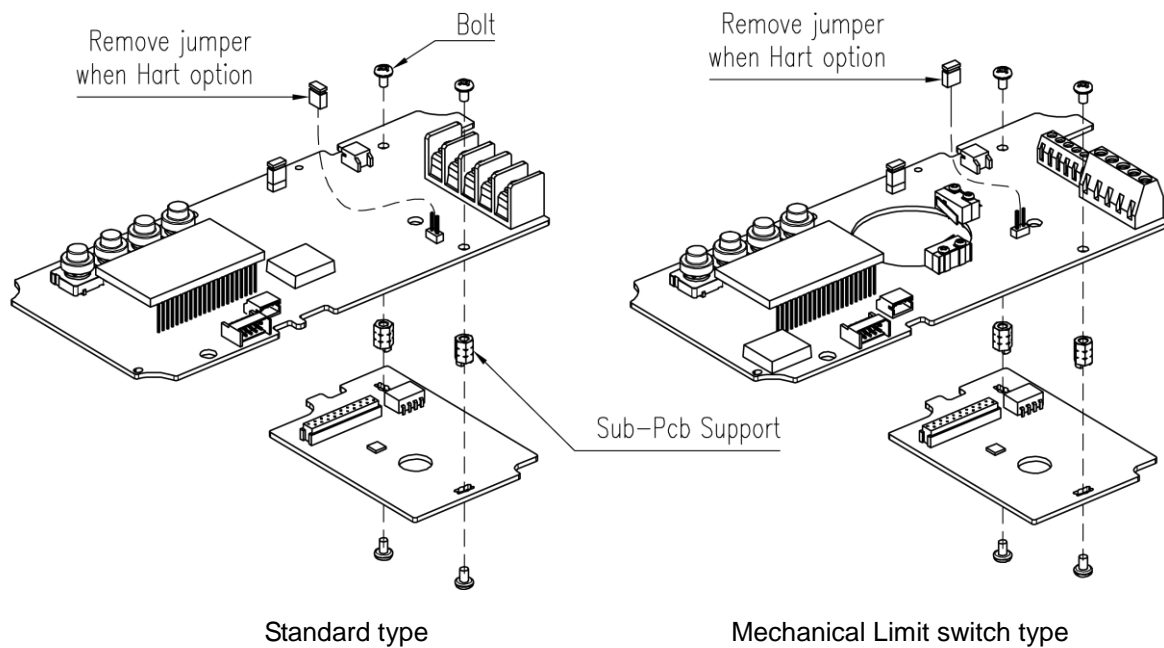


Fig. 7-2: Installation of Option PCB on Main PCBs

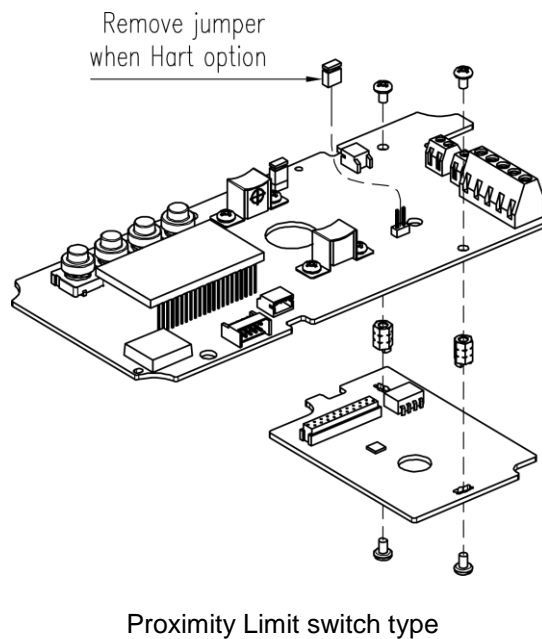


Fig. 7-3: Installation of Option PCB on Main PCBs



JP1 jumper must be removed, when HART option included sub-PCB is being mounted.

5. After PTM sub-PCB is installed newly, values of TR_ZERO and TR_END must be calibrated for correct output signals. For the calibration of TR_ZERO and TR_END, please refer to section 8.7.2 of this manual.

8. Auto Calibration and PCB Operation

8.1 Warning



Following process will operate valve and actuator. Before proceeding with any Auto Calibration, please separate valve from the entire system by using bypass valve, so Auto Calibration will not affect entire valve process.

8.2 Button Description

Positioner has 4 buttons, and they enable to perform various functions.

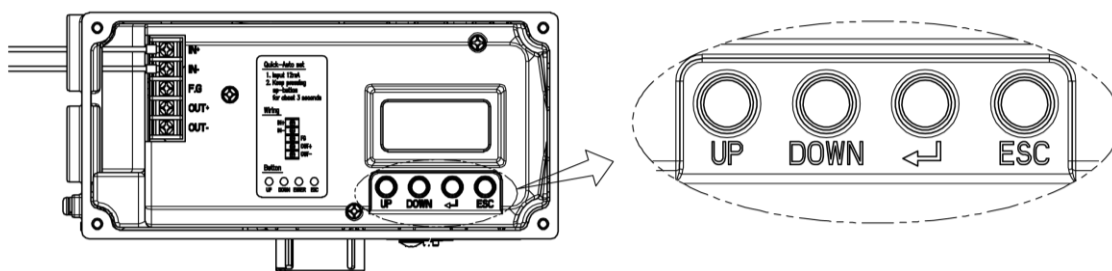
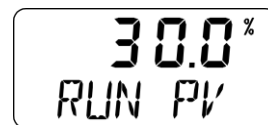


Fig. 8-1: <UP> & <DOWN >: Move to next menu, and adjust.
<ENTER>: Enter to main and sub menus, and save
<ESC>: Return to previous menu

8.3 Run Mode (RUN)

After power connection to the positioner, Run Mode will be appeared on positioner's LCD screen in about 0.5 seconds.

"RUN" indicates that the positioner adjusts the valve stroke according to the receiving signal. There are six types of display message in "RUN" Mode.



1. Run PV: Process Value - valve stroke %
2. Run SV (%): Set Value – input signal 0~100%
3. Run SV (mA): Set Value – input signal 4~20mA
4. Run MV: Manipulate Valve – Motor Manipulate Value (Digit)
5. Run VEL: Velocity – Current valve stem's velocity (Digit)
6. Run ERR: Error – Difference between SV and PV (%)

To change display, Press and hold <ESC>, press <DOWN> several times until a desired display appears. The display will change in the order indicated above. If <ESC> + <UP> pushed, the order will be appeared in opposite order. By pressing <ESC>, the display will return to "RUN PV" mode.

※ Please note that the screen will return to "RUN PV" mode if 100 seconds elapse from the last button pressed.

- ※ By pressing <ESC> button several times from any MODES, it will return to “RUN PV” mode. Therefore, if the users have entered into wrong modes by mistake or do not wish to proceed with their current work, they could return to “RUN PV” mode.

8.4 Auto Calibration mode (AUTO CAL)

Auto Calibration mode (AUTO CAL) automatically calibrates the positioner. “AUTO CAL” process takes about 2~3 minutes, and the duration of the process varies upon the size of the actuator. There are 3 types of AUTO CAL.

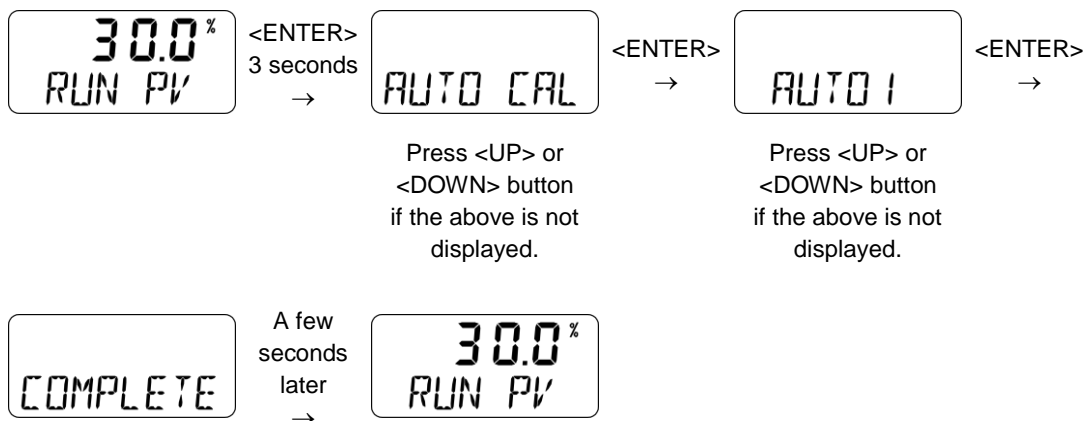
	Zero Point	End Point	P, I, D	RA / DA	BIAS	V_0
AUTO 1	○	○	X	X	X	X
AUTO 2	○	○	○	○	○	○
AUTO HF	○	○	○	○	○	○



It is recommend to perform AUTO2 calibration for initial positioner setting.

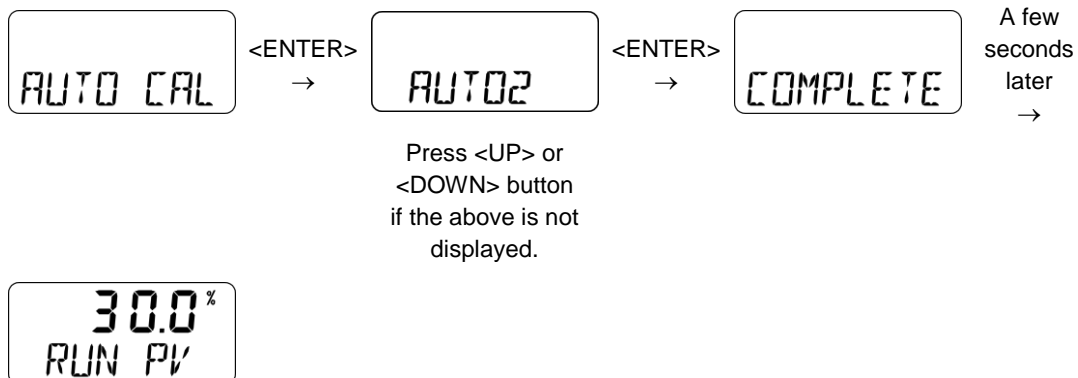
8.4.1 AUTO1 Calibration (AUTO1)

AUTO1 changes only zero and end points; however other parameters(P, I, D etc.) will not be adjusted. It is recommended to perform AUTO1 when the positioner has been set by the valve manufacturer already, and the field user wants to re-calibrate the positioner.



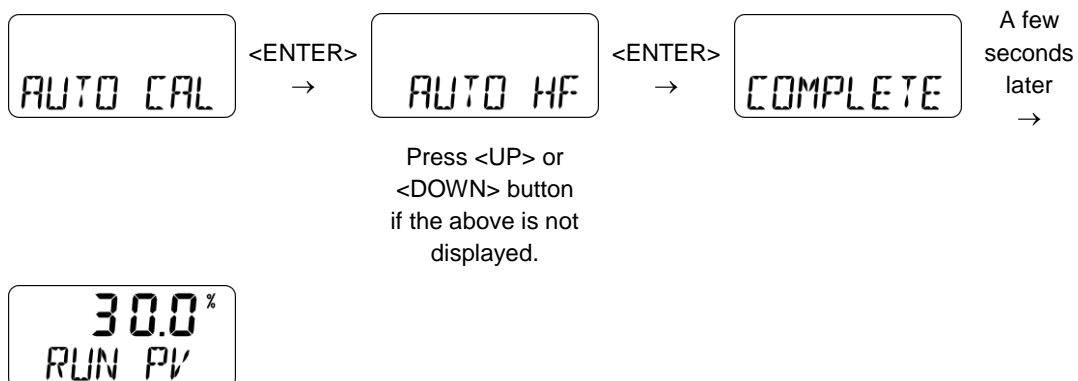
8.4.2 AUTO2 Calibration (AUTO2)

AUTO2 changes all of the parameters. It is recommended to perform AUTO2 when the positioner has been installed on the valve for the first time or the positioner has been reinstalled after disassemble from an actuator.



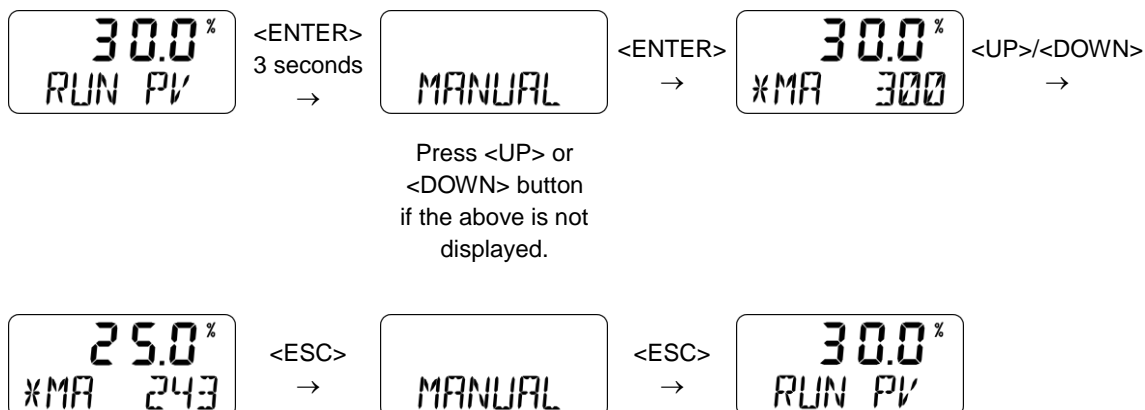
8.4.3 AUTO HF Calibration (AUTO HF)

AUTO HF calibration is same calibration process as to AUTO2, but AUTO HF is used when the valve has high friction level.



8.5 Manual Mode (MANUAL)

Manual mode is used to maneuver valve stem manually. In Manual mode, the positioner does not control the valve by the signal received from outside, but it could be controlled to move up and down by pressing <UP> and <DOWN> button.



8.6 Parameter Mode (PARAM)

AUTO CAL optimizes most of the valve actuator control values. However, in some instances, hunting or oscillation may occur when the valve actuator control values are not optimized. Hunting or oscillation can be prevented by adjusting parameter values.



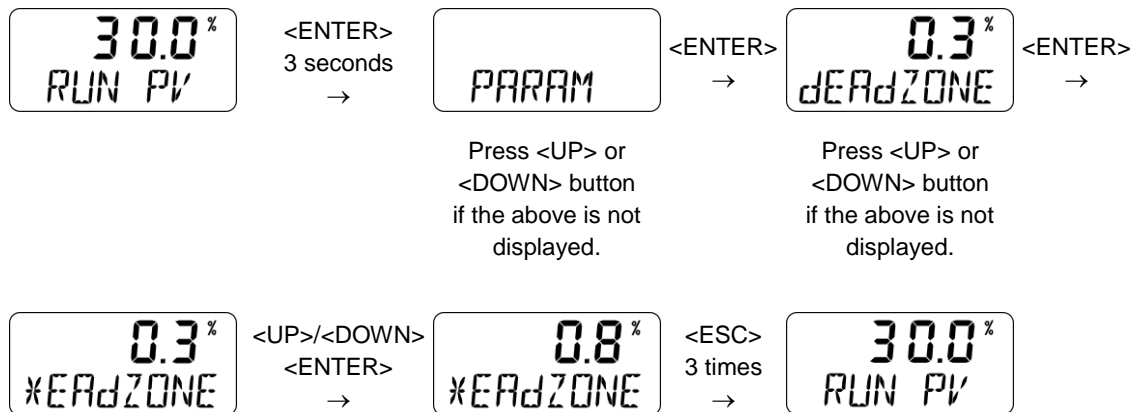
Once parameter values have been changed, the changed values are being affected as soon as you save the value. To save the changes, please ensure to press “ENTER” button. There is no need to go back to “RUN” mode after changes are being made to observe the changes.

Below are the list of features which could be set from Parameter mode.

- 1) Dead-Zone (dEAdZONE)
- 2) P value (KP)
- 3) I value (KI)
- 4) D value (Kd)
- 5) P_, I_, D_ value (KP_, KI_, Kd_)
- 6) KF Up value (KFUP)
- 7) KF Down value (KFdN)

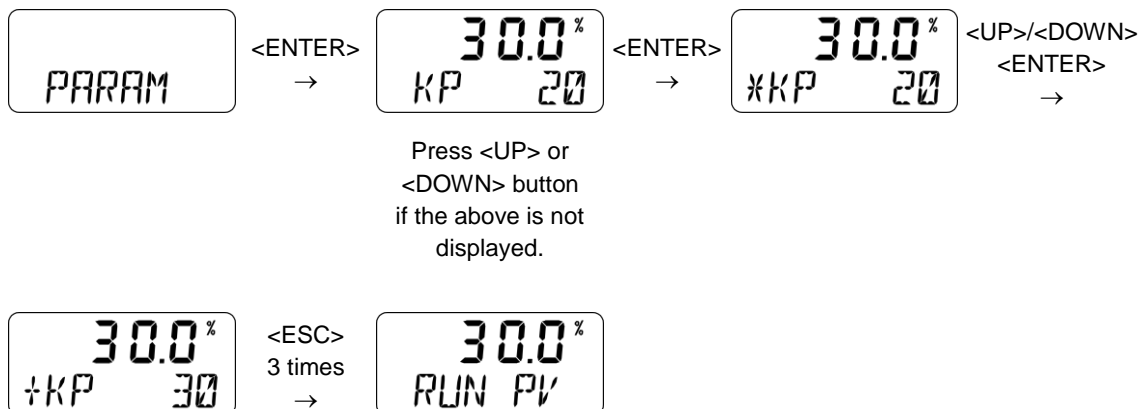
8.6.1 Dead-Zone (dEAdZONE)

Dead-Zone indicates the percentage of error allowance. In case of high level of packing friction, which may cause hunting, increasing the value of Dead-Zone can stable the valve operation.



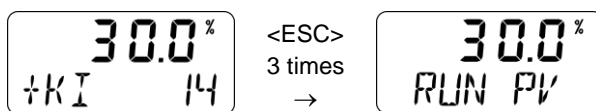
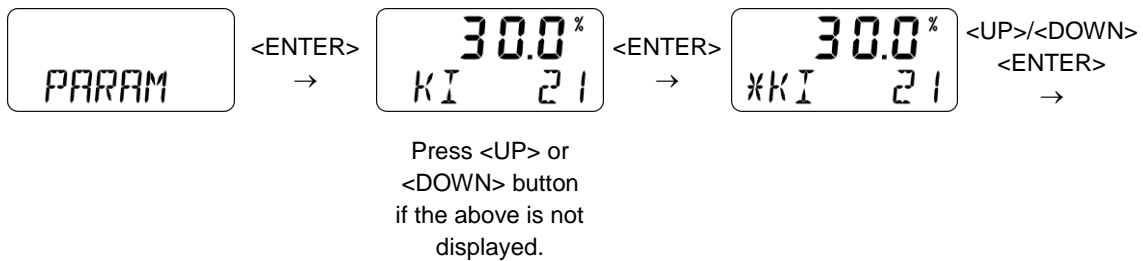
8.6.2 P Value (KP)

P value indicates the ratio of the compensation signal based on the percentage of error allowance. As the value increase, the positioner finds the target point quickly, but it is more likely to have hunting. As the value decrease, the stability of the positioner is higher, but it finds the target point slowly.



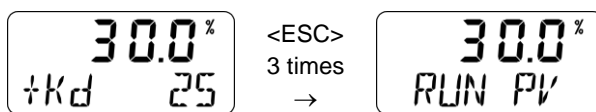
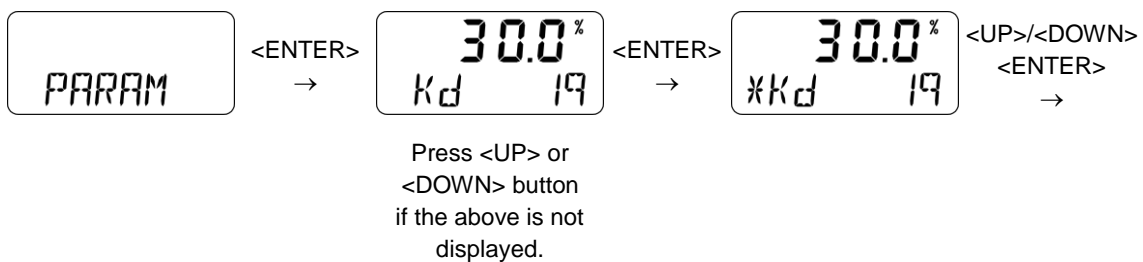
8.6.3 I Value (KI)

I value indicates the additional compensation signal based on the percentage of error allowance. As the value increase, it is more likely to have hunting. As the value decreases, the positioner will move slowly to the target position.



8.6.4 D Value (Kd)

D value indicates the derivative value of the compensation signal based on the percentage of error allowance. As the value increase, it is more likely to have hunting. As the value decreases, it can have poor linearity or dynamic characteristic.

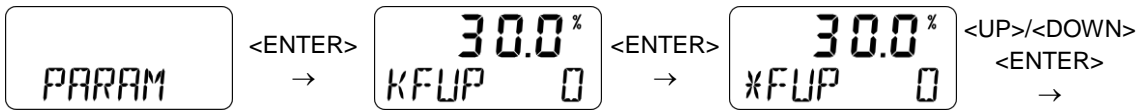


8.6.5 P_ (KP_), I_ (KI_), D_ (Kd_) Values

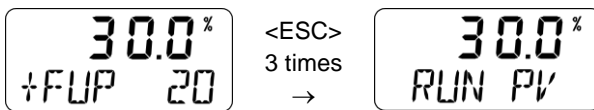
P_, I_, and D_ values' principles are same as P, I, and D values, but these values will be activated when the error percentage is within 1%.

8.6.6 KF Up Value (KFUP)

KF Up Value is a control parameter value for high level of valve friction when the valve move up from 0% to 100%.

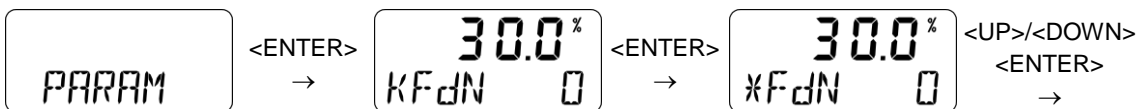


Press <UP> or <DOWN> button if the above is not displayed.

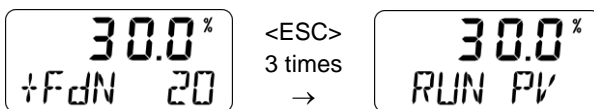


8.6.7 KF Down Value (KFdN)

KF Down Value is a control parameter value for high level of valve friction when the valve move down from 100% to 0%.



Press <UP> or <DOWN> button if the above is not displayed.



8.7 Hand Calibration Mode (HAND CAL)

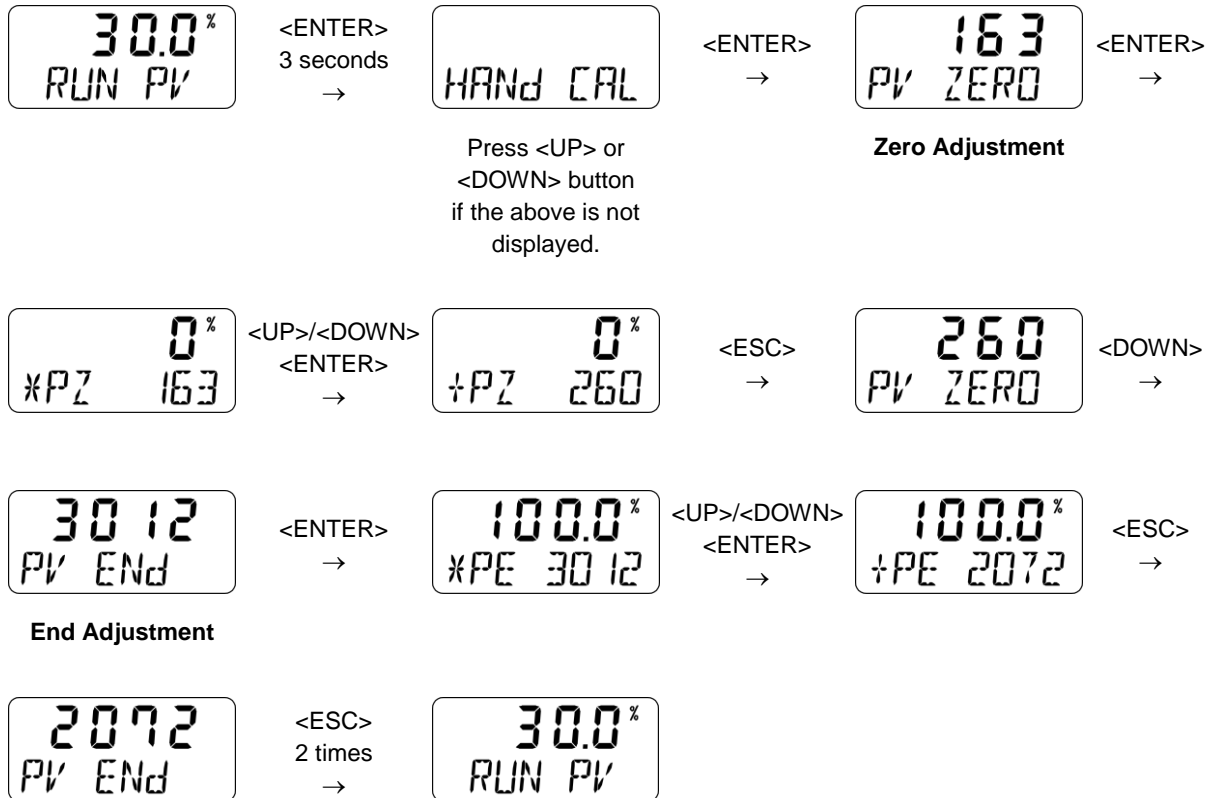
Manual Calibration mode is used when zero-point and end-point require re-adjustment to use partial range of total strokes after Auto Calibration has been performed.

Below are the list of features which could be set from Hand CAL mode.

- 1) Zero-Point (PV ZERO) and End-Point (PV END) for Valves
- 2) Zero-Point (TR ZERO) and End-Point (TR END) for Transmitter
- 3) Normal / Reverse Feedback Signal (TR NORM / REVS)
- 4) Normal / Reverse HART Signal (HT NORM / REVS)

8.7.1 Zero-Point (PV ZERO) and End-Point (PV END) for Valves

PZ ZERO adjusts the zero point of the valve, and PV END adjusts the end point of the valve.



8.7.2 Zero-Point (TR ZERO) and End-Point (TR END) for Transmitter

TR ZERO adjusts the zero point of the transmitter (4mA feedback), and TR END adjusts the end point of the transmitter (20mA feedback). This is used when output signal becomes unstable and requires re-adjustment or when feedback output signal and actual stroke need to be used differently.

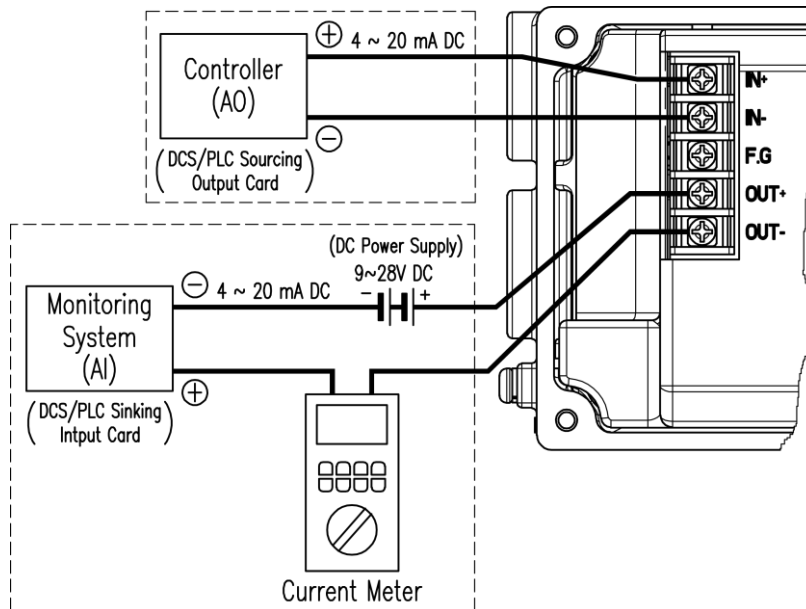
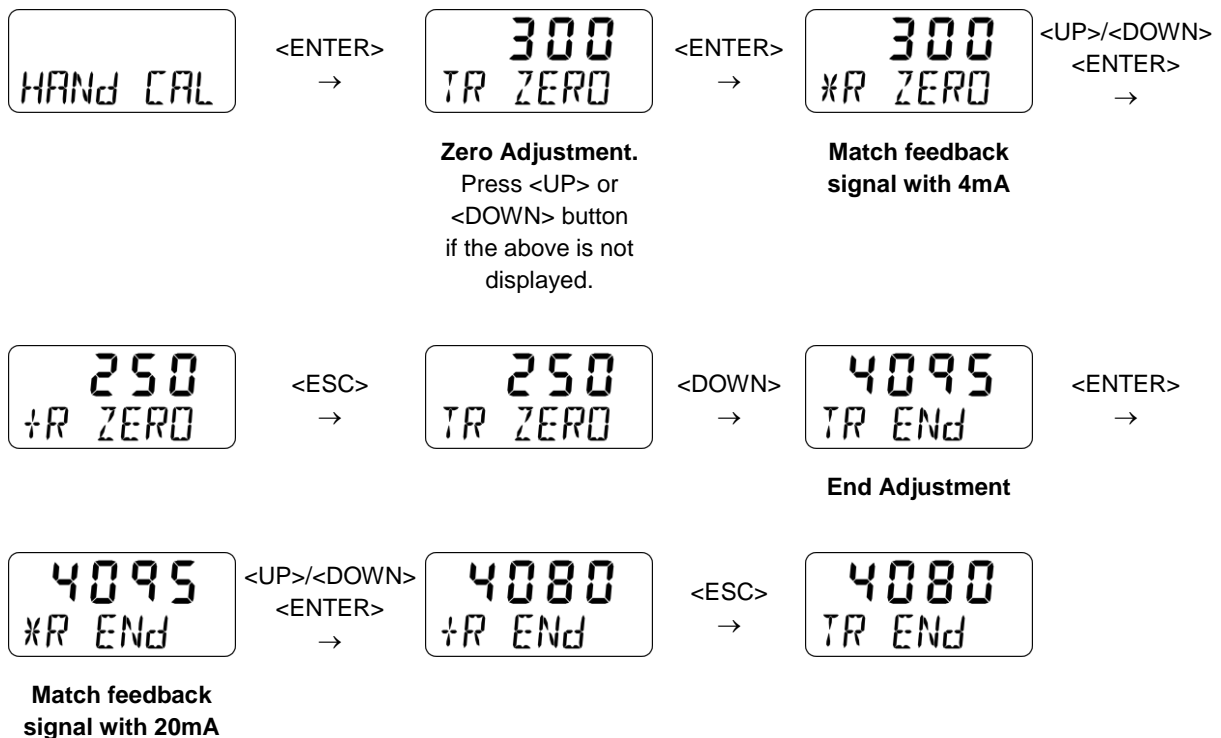


Fig. 8-2: Setting transmitter



8.7.3 Normal / Reverse Feedback Signal (TR NORM / REVS)

The feedback signal from the positioner can be changed to normal or reverse.



Press <UP> or
<DOWN> button
if the above is not
displayed.



8.7.4 Normal / Reverse HART Signal (HT NORM / REVS)

Feedback signal of HART communication from the positioner can be changed to normal or reverse.



Press <UP> or
<DOWN> button
if the above is not
displayed.



8.8 Valve Mode (VALVE)

Valve mode offers useful and various function settings for operating the control valve.

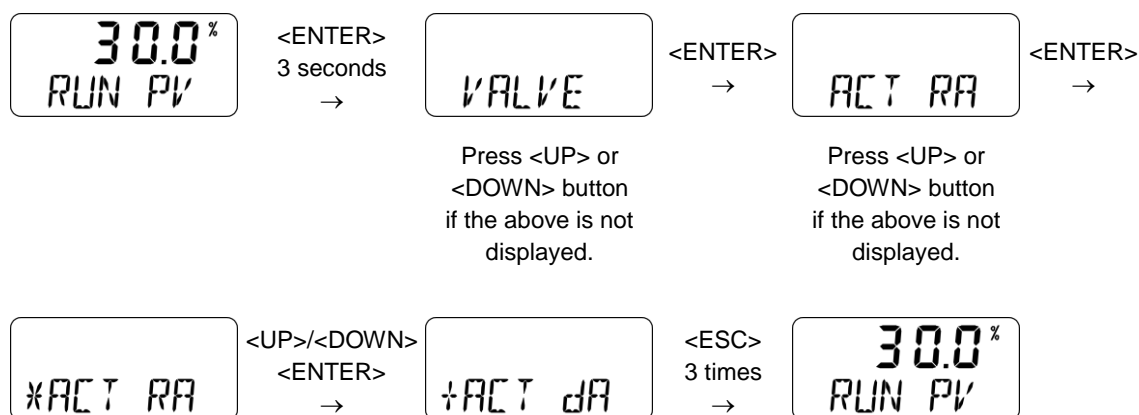
Below are the list of functions which could be set from Valve mode.

- 1) Acting Adjustment (ACT RA / dA)
- 2) Characteristic Adjustment (CHAR)
- 3) User Characteristics (USER SET)
- 4) Tight Shut Open (TSHUT OP)
- 5) Tight Shut Close (TSHUT CL)
- 6) Split Range Mode (SPLIT)
- 7) Custom Zero Setting Mode (CST ZERO)
- 8) Custom End Setting Mode (CST ENd)
- 9) Interpolation Mode (ITP OFF / ON)
- 10) Acting Type (SINGLE / dDOUBLE)
- 11) Lever Type (STd / AdT)

8.8.1 Acting Adjustment (ACT RA / dA)

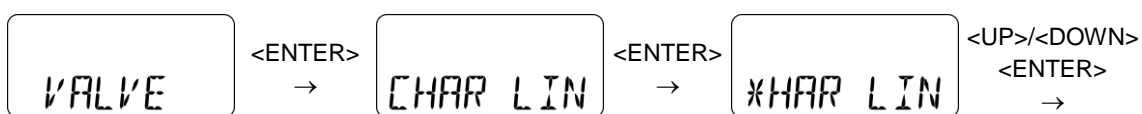
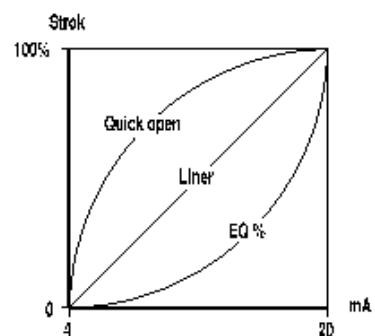
RA & DA are automatically set by performing "AUTO 2" from Auto Calibration. However, this function is used when the user wants to change RA & DA.

The positioner can be set as Direct Action (DA) or Reverse Action (RA).

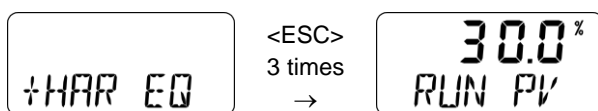


8.8.2 Valve flow Characteristic Adjustment (CHAR)

The valve flow characteristic can be set on the field's requirement. There are 4 types of characteristics – linear (LIN), user setting (USR), quick open (QO), and equal percentage (EQ).

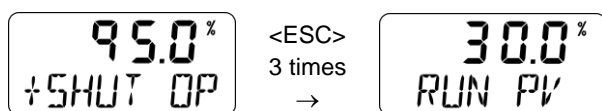
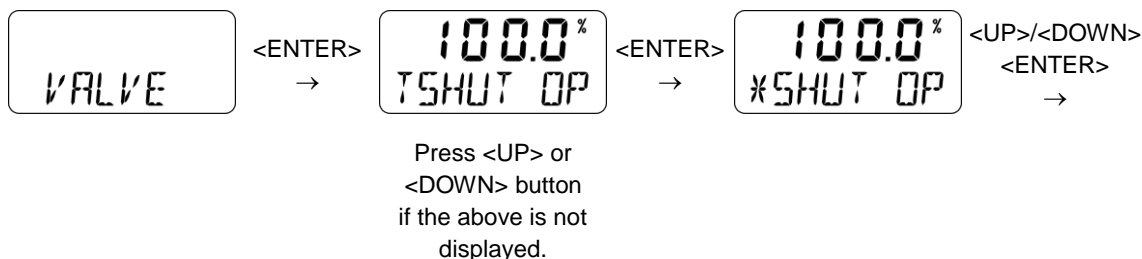


Press <UP> or <DOWN> button if the above is not displayed.



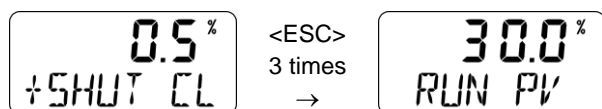
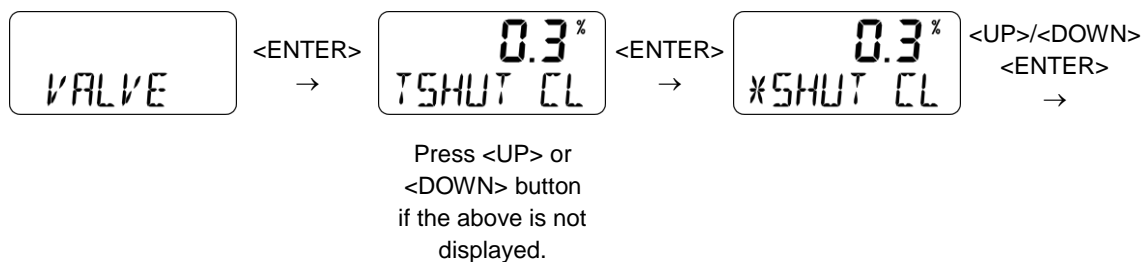
8.8.4 Tight Shut Open (TSHUT OP)

Tight shut open shows the current value in percentage (%). Input current of 4mA is 0%, 20mA is 100%. If temporary Tight shut open value ($\leq 100\%$) is set and input current value is above the set % value, the valve's position is immediately moved to 100%. For example, if linear actuator is used and the valve's closing direction is 100% and input value of the current is above Tight shut open set value, the set pressure from the regulator will be transferred to the actuator which will enhance the power to close the valve and keep it from any leakage.



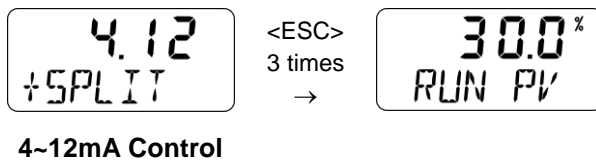
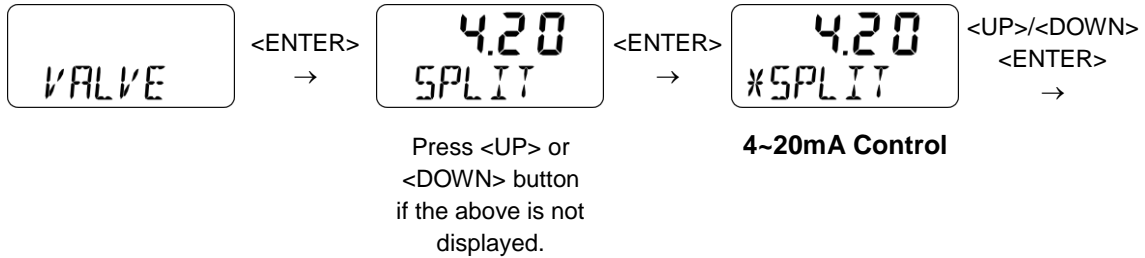
8.8.5 Tight Shut Close (TSHUT CL)

Tight shut close shows the current value in percentage (%). Input current of 4mA is 0%, 20mA is 100%. If temporary Tight shut close value ($\leq 100\%$) is set and input current value is below the set % value, the valve's position is immediately moved to 0%. For example, if rotary actuator is used and the valve's closing direction is 0% and input value of the current is above Tight shut open set value, it will release all the remaining pressure from Out1 of the actuator which will have the return spring power of the actuator or Out2 pressure to close the valve and keep it from any leakage.



8.8.6 Split Range Mode (SPLIT)

The valve can be operated in full stroke by split range control of input signal as 4~12mA or 12~20mA.

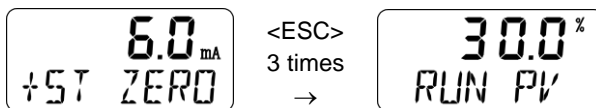
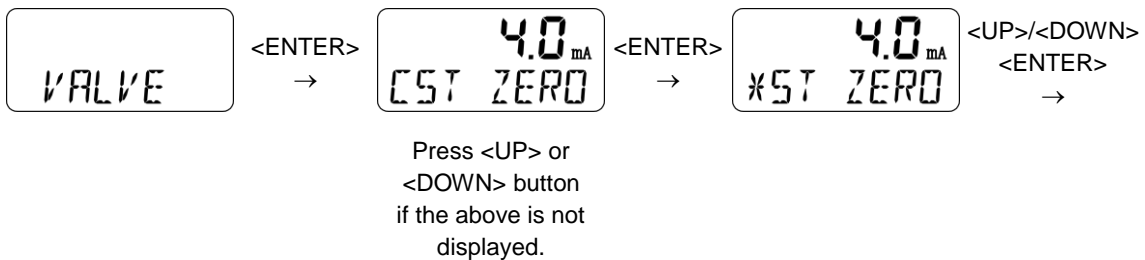


8.8.7 Custom Zero Setting Mode (CST ZERO)

From the initial 4~20mA control settings of valve stroke from 0~100%, this mode allows the user to change the zero point to (≥4) mA instead of 4mA.

For example, the user could change the control settings of the valve stroke from 4~20mA to 7~20mA for 0~100% stroke.

However, please note that the “Zero” and “End” points’ deviation current value must be above 4mA.

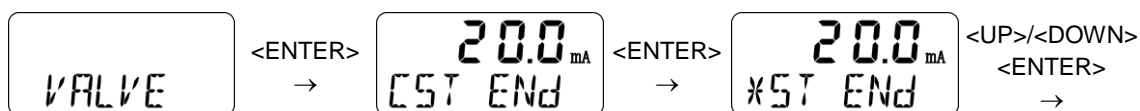


8.8.8 Custom End Setting Mode (CST ENd)

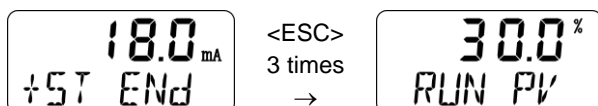
From the initial 4~20mA control settings of valve stroke from 0~100%, this mode allows the user to change the end point to (≤ 20) mA instead of 20mA.

For example, the user could change the control settings of the valve stroke from 4~20mA to 4~16mA for 0~100% stroke.

However, please note that the “Zero” and “End” points’ deviation current value must be above 4mA.



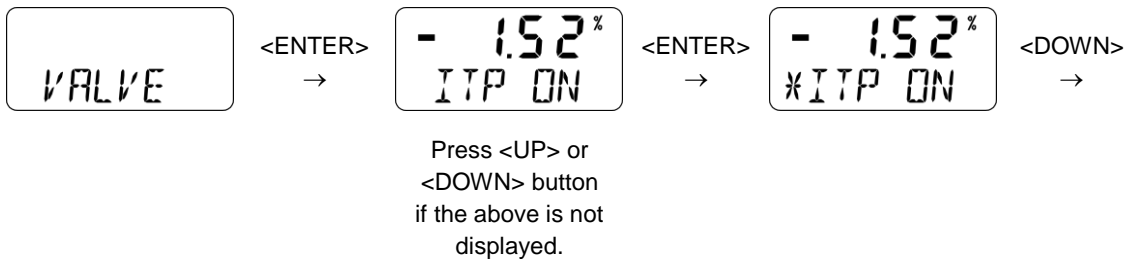
Press <UP> or
<DOWN> button
if the above is not
displayed.



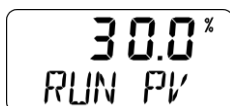
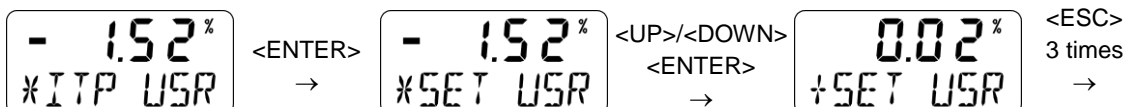
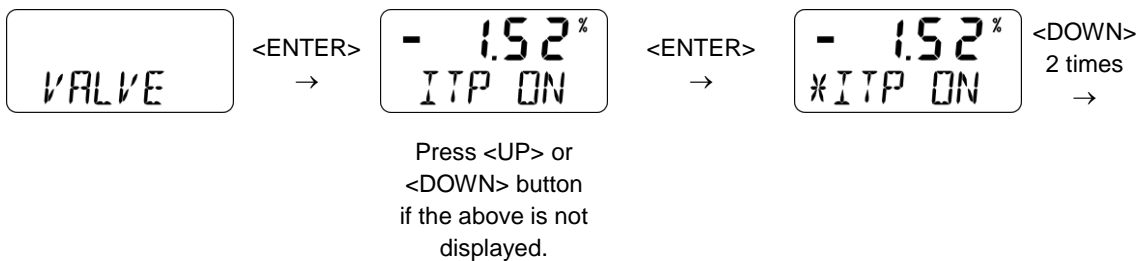
8.8.9 Interpolation Mode (ITP ON/OFF, ITP USER SET)

In case of linear positioner, the error of accuracy occurs when the linear motion of actuator changes into the rotary motion of feedback lever. After the auto calibration, the positioner turns on ITP function with an appropriate value of interpolation automatically. The user can manually turn on or off the ITP function, also can set any value of the interpolation. (in ITP USER mode)

※ The below shows that the user manually change ITP ON into OFF.

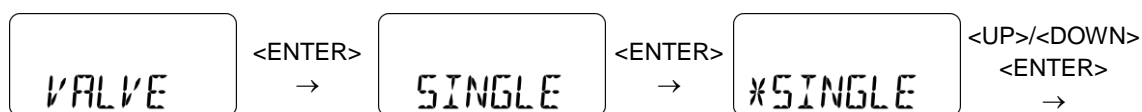


※ The below shows that the user manually set any value of the interpolation.

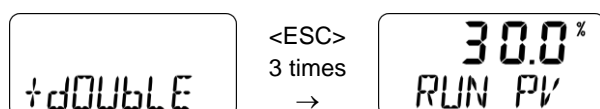


8.8.10 Acting Type (SINGLE / dDOUBLE)

Displays or changes actuator's current acting type.

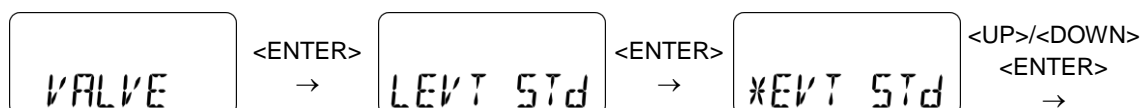


Press `<UP>` or `<DOWN>` button if the above is not displayed.

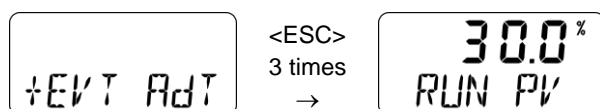


8.8.11 Lever Type (STd / AdT)

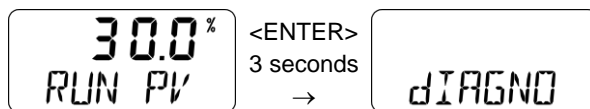
Displays or changes current lever type into standard type or adapter type. If the Lever type mode is set correctly, the accuracy will be worse at ITP ON than at ITP OFF.



Press `<UP>` or `<DOWN>` button if the above is not displayed.



8.9 Diagnostic (dIAGNO)



Press <UP> or
<DOWN> button
if the above is not
displayed.

8.9.1 PST Introduction

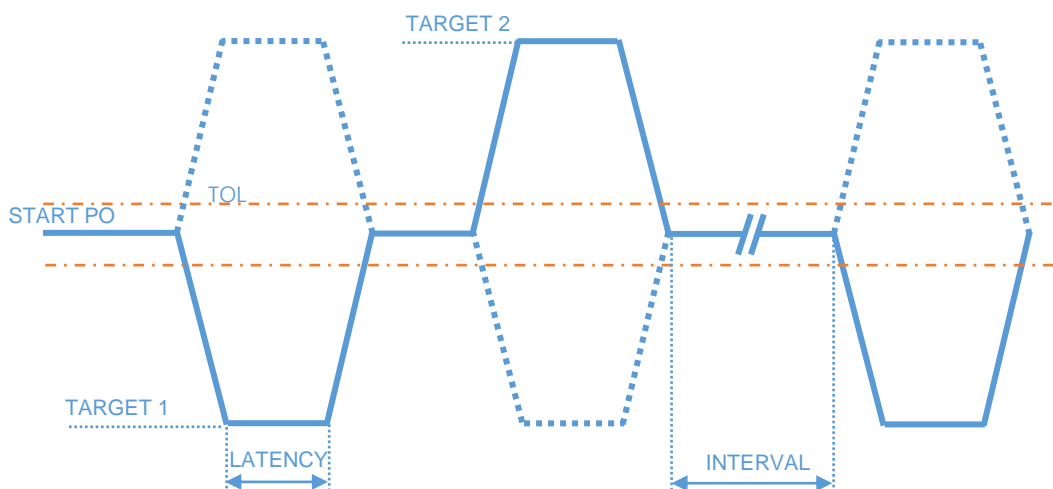
Unlike FST (Full Stroke Test) where a valve such as an emergency shut-off valve is physically closed and opened in full,

PST is a method used to test a percentage of the possible failure of the valve by slightly closing and opening the valve when testing.

Rather than only performing FST regularly, PST is alternately applied with FST which could reduce the overall cost and risk.

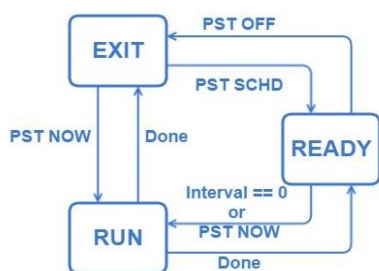
YT-3300 positioner includes PST function and it could operate while offline without any other software.

Also, PST function and results could be set and checked through HART communication.



When **PST** runs by **PST NOW** or **SCHD**, if valve position is in the range of **TOL** from **START PO**, Positioner supply or vent air until the valve reach the **TARGET 1, 2**. But **PST** test will stop if valve position goes out of the **TOL** or doesn't reach **TARGET1, 2** within the **LIMIT TM**. After the valve position reach the **TARGET 1, 2**, the valve will pause during the **LATENCY** and move back to the **START PO**. The valve will be under ready state during the **INTERVAL** time after completing 1 cycle of **PST** in the **SCHD** mode.

8.9.2 PST Mode

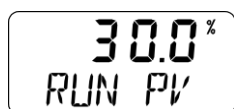
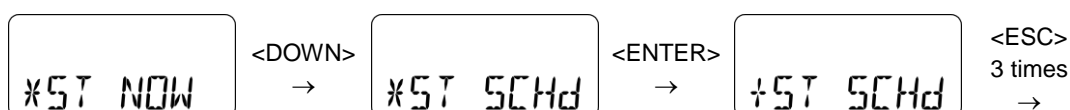


To run **PST**, select a **PST** mode. There are 3 mode for running PST.

Mode	Description
PST OFF	Stop PST Schedule. It's a default mode
PST SCHED	Run PST immediately. After PST complete, it turns back to the previous mode
PST NOW	PST runs repeatedly by interval value

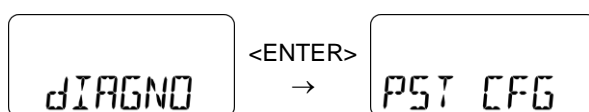


Press <UP> or <DOWN> button if the above is not displayed.



8.9.3 PST CFG

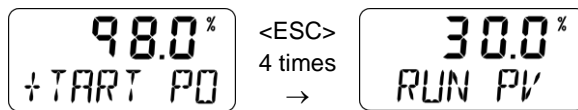
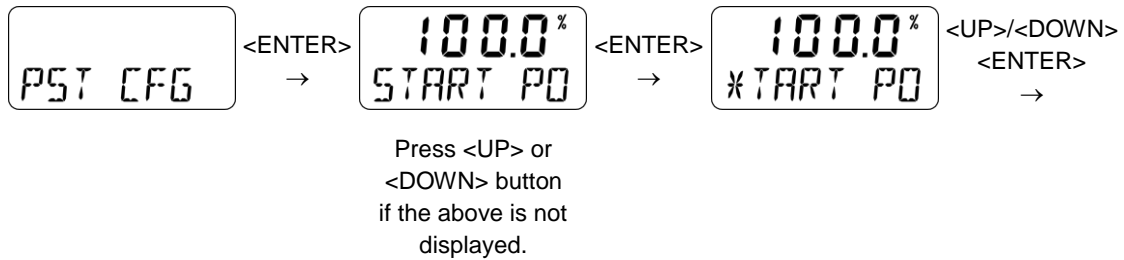
Check PST parameter values and configuration



Press <UP> or <DOWN> button if the above is not displayed.

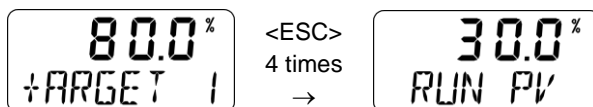
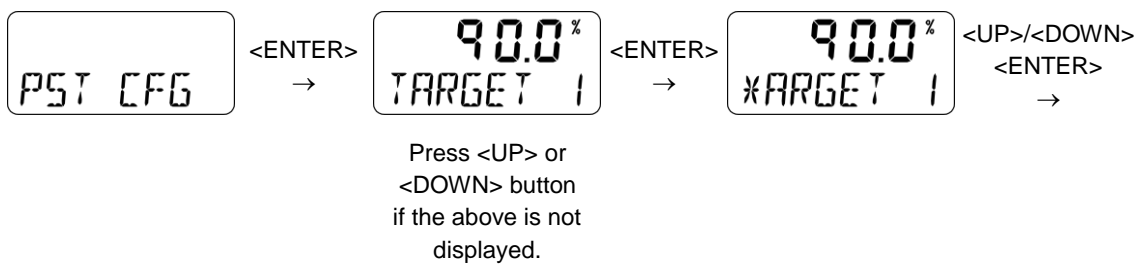
8.9.3.1 START PO

Sets start position when PST initiates. The position must be in between 0 and 100%, and default value is 100%.



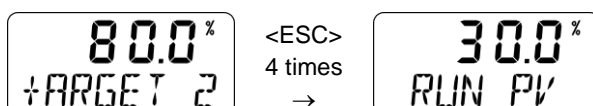
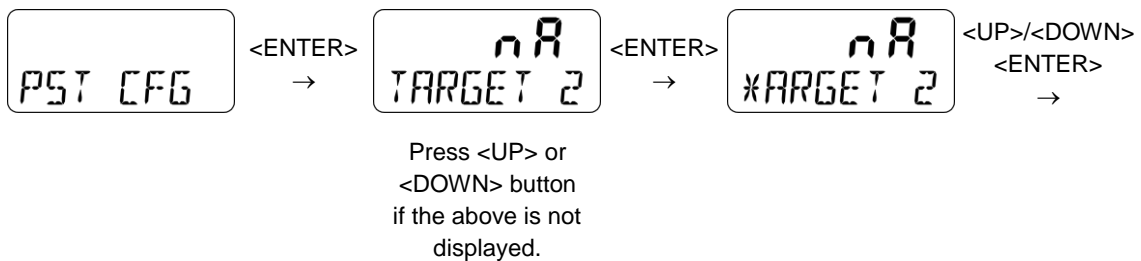
8.9.3.2 TARGET 1

Sets 1st target position of PST. The position must be in between 0 and 100%, and default value is 90%.



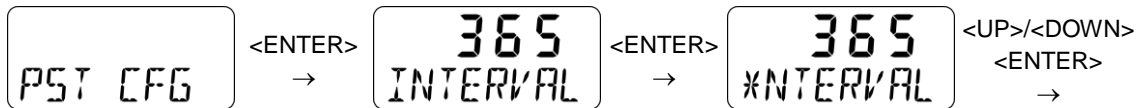
8.9.3.3 TARGET 2

Sets 2nd target position of PST. The position must be in between 0 and 100%, and default value is nA(Not Application).

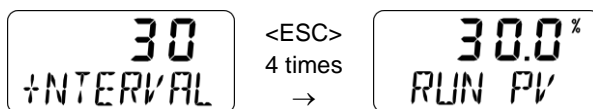


8.9.3.4 INTERVAL

Interval time (days) between 1st PST and the next PST. The value must be between 1 ~ 365, and default value is 365 (days).

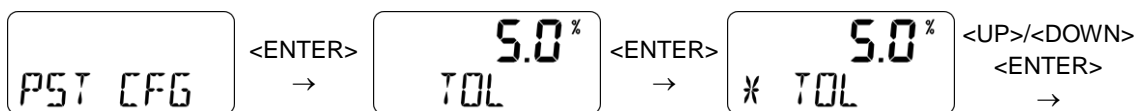


Press <UP> or <DOWN> button if the above is not displayed.

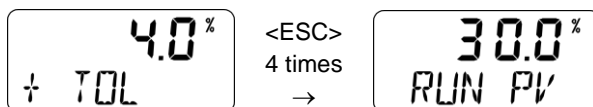


8.9.3.5 TOL

Tolerance level of the start position when PST runs. The value must be between 0.1 ~ 10%, and default value is 5%.

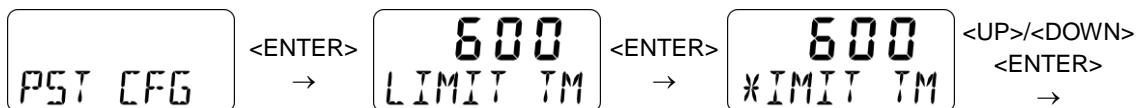


Press <UP> or <DOWN> button if the above is not displayed.

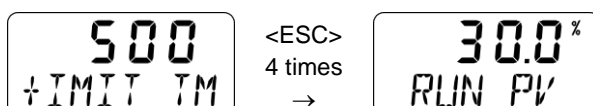


8.9.3.6 LIMIT TM

Limit the stroke time between start position and Target 1 and 2. The value must be between 0~600 sec, and default value is 600 (sec).

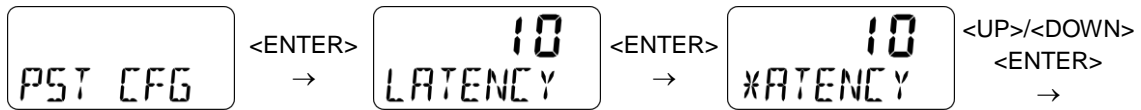


Press <UP> or <DOWN> button if the above is not displayed.

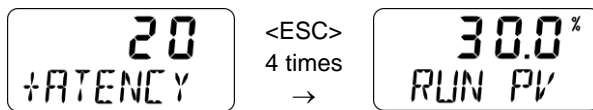


8.9.3.7 LATENCY

Latency for next movement after valve move. The value must be between 1~60 sec, and default value is 10 (sec).



Press <UP> or <DOWN> button if the above is not displayed.



8.9.4 PST RSLT

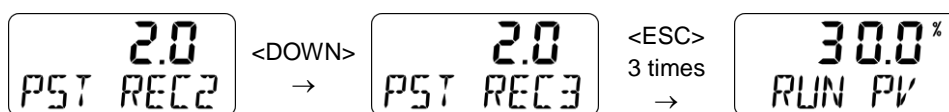
It will record or memorize maximum three **PST** results. The longest stroke time from **START PO** to the **TARGET 1, 2** or Error messages will be recorded

NAME	VALUE	DEFAULT
PST REC1	OOT,LTO,NR, 0 ~ 600(sec)	0
PST REC2	OOT,LTO,NR, 0 ~ 600(sec)	0
PST REC3	OOT,LTO,NR, 0 ~ 600(sec)	0

Error	Message
OOT	When the valve position is out of tolerance(TOL) from Start Position(START PO)
LTO	When the valve doesn't reach to the target position within the Limit Time(LIMIT TM)
NR	When the valve doesn't move



Press <UP> or <DOWN> button if the above is not displayed.

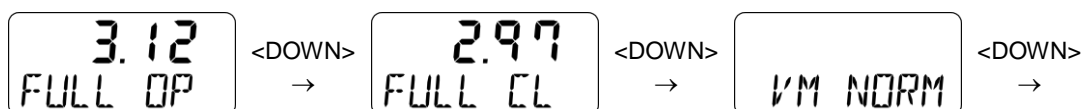
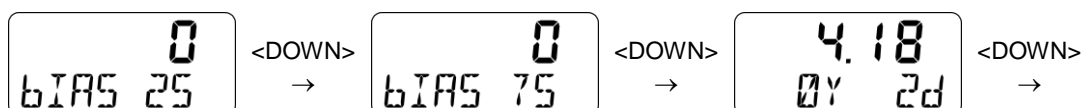


8.10 View Mode (VIEW)

Displays various information of the positioner.



Press <UP> or <DOWN> button if the above is not displayed.



ITEM	Description
YT-3300L	Positioner model.
3.1.00 VERSION / 2016MR 8	1'st row→version number of firmware. 2'nd row→VERSION: Main software version / 2016MR 8: loading date of software. ※ You can toggle them, pushing <ENTER>
HART REV	HART protocol version
POL Addr	HART protocol channel address. ※ You can change it, pushing <ENTER>
BIAS 25	BIAS value when valve position is at 25%
BIAS 75	BIAS value when valve position is at 75%
4.18 0Y 0d	Total used time duration. If a unit was used less than 1 minute, the time will not accumulate. 1'st row→"4.18" means 4hours and 18minutes. 2'nd row→0Y: years, 0d: days
3.12 FULL OP	Time required (seconds) to fully open the current valve from the closed state. Saved after AUTO 2 or AUTO HF Calibration.
2.97 FULL CL	Time required (seconds) to fully close the current valve from the opened state. Saved after AUTO 2 or AUTO HF Calibration.
VM NORM / VM REVS/ VM dIZ	Display types of valve stroke on LCD. VM NORM : View Mode Normal. 4mA → 0%, 20mA → 100% display. VM REVS : View Mode Reverse. 4mA → 100%, 20mA → 0% display. VM dIZ : Raw data. ※ You can change it, pushing <ENTER>
Erro	Error code(C, D) or warning code(B, F, G, H). Refer to 9.1 or 9.2 sections
VALUE I	Current accumulated value of I
ABS	Absolute resistance value.
Temp	Current Temperature. (°C)
W LOCK / W UNLOCK	When W UNLOCK, you can parameters including auto calibration function. When W LOCK, cannot. You can change it, pushing <ENTER>

9. Error and Warning Code

Below error and warning codes can be checked from “View” mode if there are any problems while using the product.

9.1 Error code

Error codes are indicated if the positioner cannot be controlled, malfunctions or becomes imprecise.

Error Code	Code Description and Cause	Action
MT ERR L	<ul style="list-style-type: none"> ➤ Indicates that due to wrong positioning and installation of the positioner, there is a chance that the feedback lever and the positioner’s stopper could collide when the lever is at 0% during auto calibration. ➤ when this error is detected, auto calibration is aborted and this message is indicated immediately on LCD display. 	<ul style="list-style-type: none"> ➤ Set the feedback lever horizontally when at 50%. ➤ Re-adjust the position of the positioner by referring to the following effective range of the feedback lever’s angle (YT-3300 / 3350 linear : 60 deg., YT-3303 / 3301 linear : 30 deg., rotary : 90 deg.)
MT ERR H	<ul style="list-style-type: none"> ➤ Indicates that due to wrong positioning and installation of the positioner, there is a chance that the feedback lever and the positioner’s stopper could collide when the lever is at 100% during auto calibration. ➤ when this error is detected, auto calibration is aborted and this message is indicated immediately on LCD display. 	
CHK AIR	<ul style="list-style-type: none"> ➤ Indicated when the valve is not moving despite the positioner has given “Full Open” signal during auto calibration. ➤ when this error is detected, auto calibration is aborted and this message is indicated immediately on LCD display.. 	<ul style="list-style-type: none"> ➤ Check if pressure is being supplied normally to the positioner.
RNG ERR	<ul style="list-style-type: none"> ➤ Indicated when the feedback lever’s angle used is excessively small during auto calibration. ➤ when this error is detected, auto calibration is aborted and this message is indicated immediately on LCD display. 	<ul style="list-style-type: none"> ➤ Re-install the positioner by moving it towards the actuator stem so that the angle use of the feedback lever becomes larger.

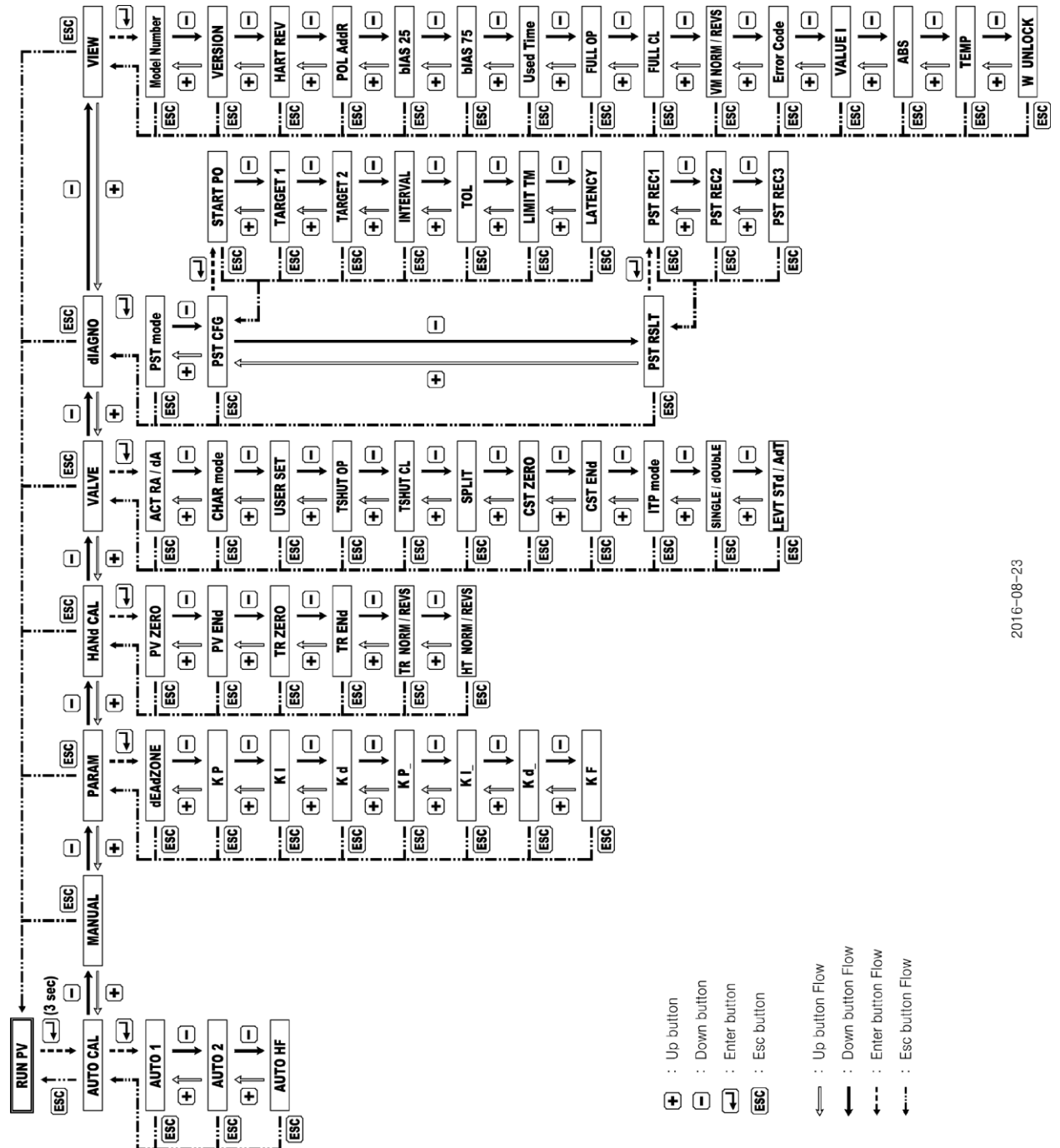
C	<ul style="list-style-type: none"> ➤ Indicated if the deviation between SV and PV is above 10% and is continued for over one minute. ➤ Indicated when the valve does not operate, friction is extremely high or when the air regulator's set pressure is too low. ➤ Can be checked from "Error" category in View mode. (Refer to section 8.10) 	<ul style="list-style-type: none"> ➤ Re-perform auto-calibration. ➤ Check air regulator's set pressure and re-adjust to appropriate pressure.
D	<ul style="list-style-type: none"> ➤ Accumulated I value is I max or min's limit. ➤ Degree of precision is low. ➤ Indicated if valve's friction is extremely high or set pressure of air regulator has been changed. ➤ Can be checked from "Error" category in View mode. (Refer to section 8.10) 	<ul style="list-style-type: none"> ➤ Re-perform auto-calibration ➤ Check air regulator's set pressure and re-adjust to appropriate pressure.

9.2 Warning code

Below codes are indicated when the positioner can be controlled, but there is a possibility of malfunctioning or degree of precision has dropped.

Warning Code	Code Description and Cause	Action
B	<ul style="list-style-type: none"> ➤ PV Span – PV Zero range is below 500. ➤ Feedback lever's angle use is too low. ➤ Can be checked from "Error" category in View mode. (Refer to section 8.10) 	<ul style="list-style-type: none"> ➤ Re-position the positioner so that the angle use of the feedback lever is larger than current angle. Then, perform AUTO1 calibration.
F	<ul style="list-style-type: none"> ➤ Full open & Full close time is less than 1 second. ➤ Size of the actuator is too small. ➤ Can be checked from "Error" category in View mode. (Refer to section 8.10) 	<ul style="list-style-type: none"> ➤ Use orifice and lower the flow rate. ➤ Or replace the actuator with bigger size.
G	<ul style="list-style-type: none"> ➤ PV is set below 100. ➤ Feedback lever's angle use is set too high. ➤ Can be checked from "Error" category in View mode. (Refer to section 8.10) 	<ul style="list-style-type: none"> ➤ Re-position the positioner so that the angle use of the feedback lever is smaller than current angle. Then, perform AUTO1 calibration.
H	<ul style="list-style-type: none"> ➤ PV is set above 4000. ➤ Feedback lever's angle use is set too high. ➤ Can be checked from "Error" category in View mode. (Refer to section 8.10) 	

10. Main Software Map



2016-08-23

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