



Ex II 2 G/D EEx ia IIC T6

YT-2300 Electro-pneumatic positioner. Installation, Operation & Maintenance instructions

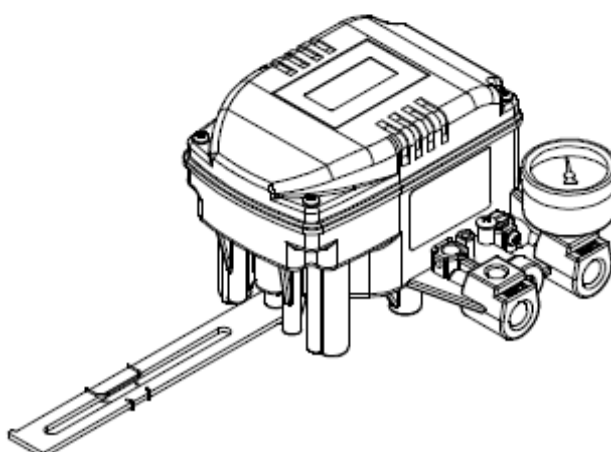
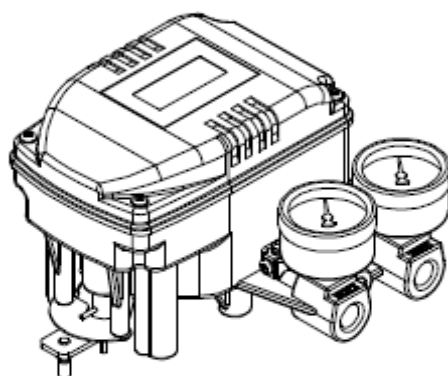


Doc: YT-2300R/IOM/01

Aug 2007

Smart Positioner
YT-2300 Series

USER'S MANUAL





Ex II 2 G/D EEx ia IIC T6

YT-2300 Electro-pneumatic positioner.

Installation, Operation & Maintenance instructions



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Manual description

Thanks for purchasing our products.

Our products are produced and inspected under the strict standards. In order to use the products appropriately and efficiently we recommend that users read this manual carefully and fully understand.

- * This manual should be delivered to the end user.
- * This manual can be changed without prior notice.
- * This manual, in whole or part, shall not be transcribed or copied without approval by YTC.
- * Changes of specification, structure and components may not lead to the immediate revision of this manual.

Notes on safety and warranty

* Before handling YT-2300, it is absolutely imperative that users read and observe the safety instructions in this manual in order to ensure the protection and safety of operators.

* We do not have responsibility for the damage caused by users' repair or conversion of the item. If the repair or conversion is necessary, submit inquiries.

* Warranty period is marked on the quotation sheet, which is free of charge in principle.

* For the following cases some cost shall be charged.

- Inappropriate maintenance by users
- Inappropriate transportation and storage
- The product is used beyond specification.
- Inappropriate installation
- Uncontrollable disaster such as fire, earthquake, storm, flood, etc



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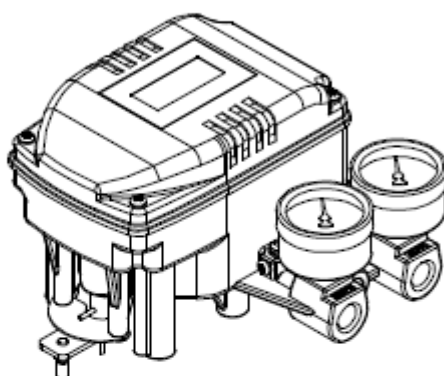


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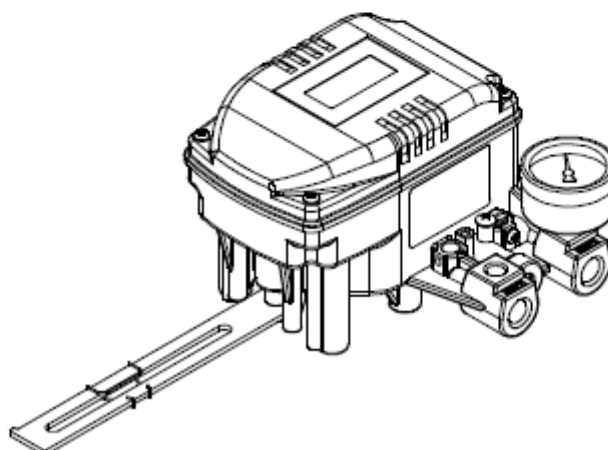
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Product Description

YT-2300 Smart Valve Positioner controls valve stroke accurately according to input signal of 4-20mA being input from controller. In addition, highly efficient microprocessing operator built in the product performs various and powerful functions like Auto calibration, PID control, Alarm and Hart protocol.



YT-2300R Smart Positioner



YT-2300L Smart Positioner



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Features and functions

1. LCD equipped outside of product makes to check the positioner condition in the field directly.
2. It endures severe vibration.
3. It is operated normally regardless of change of supply pressure during operation.
4. Auto calibration method is very simple.
5. It is easily equipped on small actuator because of its small size.
6. Air consumption is so small that operating cost in huge plants is decreased.
7. Because it can be used in low voltage (8.5V), there is no limitation in controller.
8. Variable orifice is applied and so in case of small actuator the hunting is controlled to the optimum condition during operation.
9. Hart communication makes to process various information of valve and positioner.
10. Valve system is stable by outputting analog feedback signal.
11. The adjustment of Valve characteristics (Linear, Quick open, Equal percentage) is available.
12. Specific flow control is available with setting 16 point at users' command.
13. Tight Shut-Close and Shut-Open can be set voluntarily.
14. PID parameters can easily adjusted in the field without additional communicator.
15. The pressure of Air filter regulator is sent to Actuator directly with using A/M switch.
16. Split range such as 4-20mA, 12-20mA is available.
17. Setting Zero and Span as partial section is available by Hand Calibration function.
18. The valve defect is easily checked because the valve can be operated voluntarily.
19. It has IP 66 protection grade.
20. Air filter regulator can be attached with the product with only one linear nipple without extra piping.
21. Because of Epoxy polyester powder coating, it can be used for long period of time in corrosive air.
22. Because of simple and modulized inner structure, maintenance is very easy.



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Nameplate Description

Model number

Product model name and additional option codes

Refer the next chapter for detailed ordering number.

Protection

Protection grade applied to the product

It has IP66 protection grade.

Input signal

Current input signal range

DC 4-20mA current is used.

Ambient temperature

Ambient temperature range for operating product

Standard ambient temperature is -20°C to 70°C.

Supply pressure

Supply pressure range inputting product

It is set as 1.4-7 kgf/cm² (0.14-0.7 MPa).

Serial number

The numbers given each product

By tracking this number various information for the item can be collected.



SMART POSITIONER

MODEL NUMBER	: YT-2300LSn25121
PROTECTION	: IP66
INPUT SIGNAL	: 4~20mA DC
AMBIENT TEMP.	: -20~70°C
SUPPLY PRESSURE	: 1.4~7 kgf/cm ²
SERIAL NUMBER	: 15001

Made In Korea

YT-2300 Label



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Ordering number

YT-2300 series use the following ordering numbers.

YT-2300 1 2 3 4 5 6 7

1. Motion type	L : Linear R : Rotary
2. Acting type	S : Single acting D : Doble acting
3. Explosion proof	n : Non explosion proof
4. Feedback lever (YT-2300L)	1 : 10 ~ 40 mm 2 : 20 ~ 70 mm 3 : 50 ~ 100 mm 4 : 100 ~ 150 mm (note 1)
Feedback lever (YT-2300R)	1 : M8 x 40L 2 : M8 x 63L 3 : M8 x 40L 4 : M8 x 63L 5 : Namur standard
5. Connection type	1 : PT 2 : NPT
6. Communication	0 : None 2 : Hart communication
7. Option	0 : None 1 : Position transmitter

Note 1. No. 4 lever (100 ~ 150mm) is connected one of No. 2 and No. 3 lever.



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Specification

Model	YT-2300L		YT-2300R	
	Single	Double	Single	Double
Acting Type	Single	Double	Single	Double
Input Signal	4~20 mA DC			
Minimum Current Signal	3.2mA(Standard), 3.8mA(Hart Included)			
Supply Pressure	1.4~7kgf/cm ² (0.14~0.7 MPa)			
Stroke	10 - 150 mm		60 - 90°	
Impedance	Max.500 Ohm/20mA DC			
Air Connection	PT 1/4, NPT 1/4			
Gauge Connection	PT 1/8, NPT 1/8			
Conduit Entry	PF 1/2(Standard), NPT1/2(Option)			
Protection	IP66			
Ambient Temperature	-30~80℃			
Linearity	±0.5% F.S.			
Hysteresis	0.5% F.S.			
Sensitivity	±0.2% F.S.			
Repeatability	0.3% F.S.			
Flow Capacity	70 LPM			
Air Consumption	below 2 LPM (sup=1.4K), below 3 LPM (sup.=7K)			
LCD Temp. Condition	Storage Temp:-30~85℃, Operating Temp:-10~70℃			
Output Characteristic	Linear, Quick Open, EQ%, User Set (16 Point)			
Vibration Effect	6G			
Humidity	5-95% RH at 40℃			
Communication (Option)	HART Communication (Non-DDL)			
Feedback Signal (Option)	4-20mA (DC 10 - 30V)			
Material	Aluminum Diecasting			
Weight	1.5 kg (3.3 lb)			
Painting	Epoxy Polyestere Powder Coating			
Color	Blue or Black			

1. Based on temperature 20℃, absolute pressure 760mmHg and relative humidity 65%
2. Contact us for the product beyond the specification.
3. To change Product color or to use user's own label is available, but they are limited to the big volumes of quantity. Contact our sales dept.



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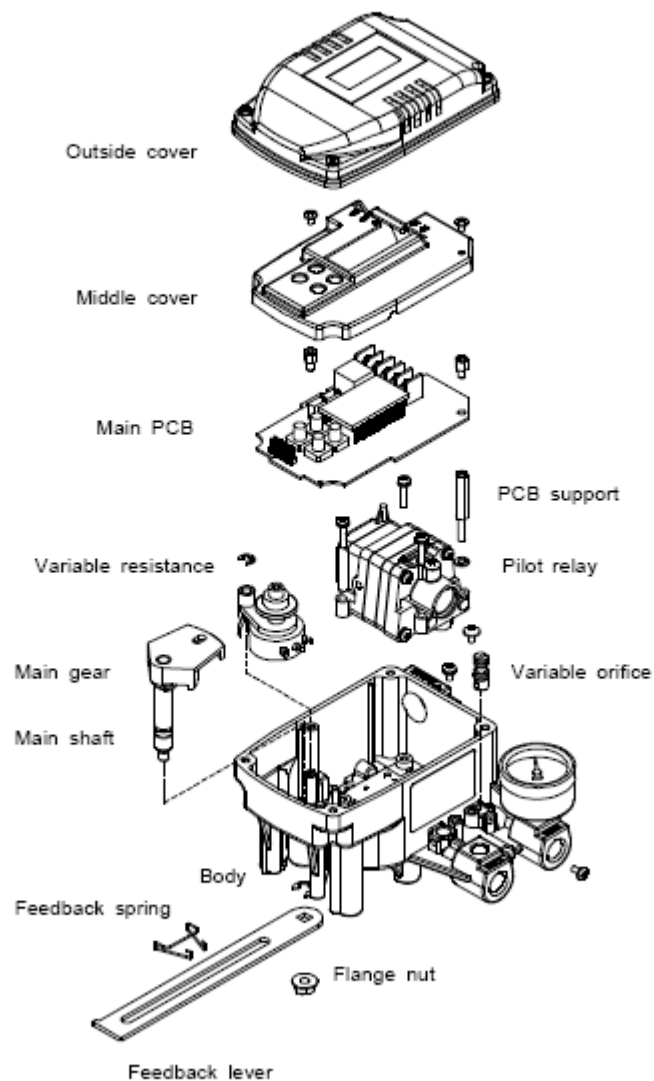


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Structure

The structure of YT-2300L is as follows. That of YT-2300R is as same as linear type except feedback lever.



YT-2300 Structure



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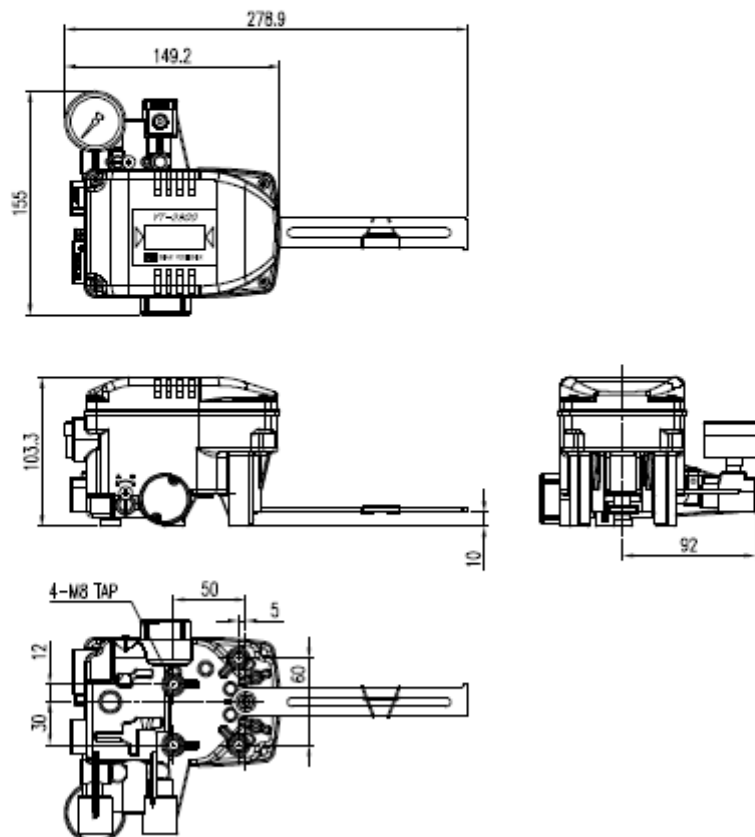
Installation

Note

When the positioner is installed with the actuator or replaced, ensure the followings.

- All inputs and supply pressure to valve, actuator and other instrument must be shut down.
- In order entire system not to shut down the control valve must be separated from the system by bypass valve or other equipment.
- No pressure remains in the actuator.

YT-2300L drawing



YT-2300L drawing



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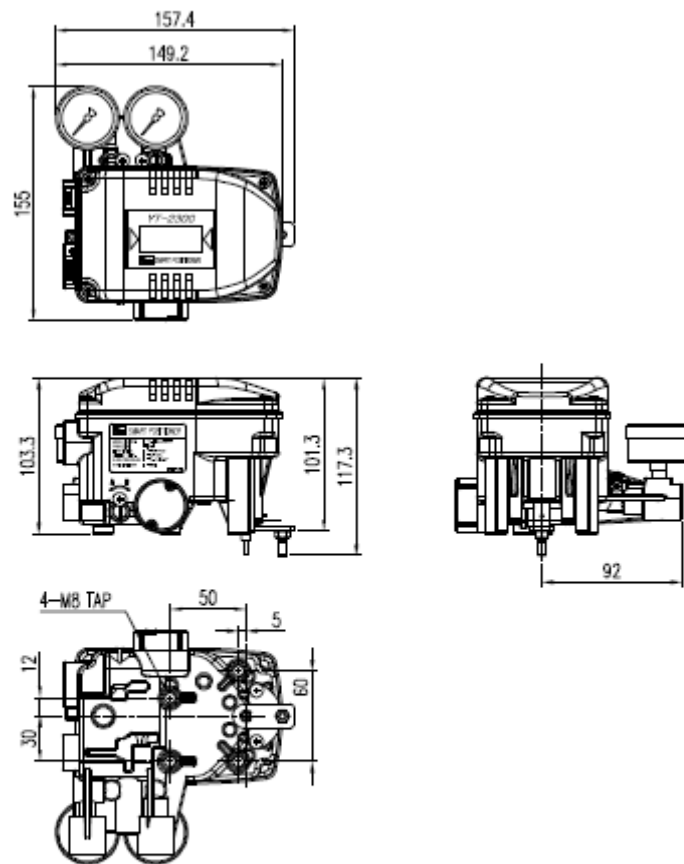
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YT-2300R drawing



YT-2300R drawing

* The brackets for attaching on the actuators are made by using these drawings and they are also used for checking piping, etc.



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Tools for installation

Tools and bolts used for assembly are,

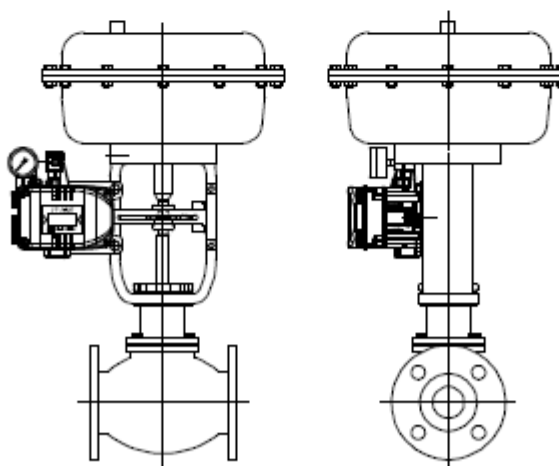
1. Hexagonal wrenches
2. (+) screw driver
3. (-) screw driver
4. Spanners for hexagon head bolts

YT-2300L installation

YT-2300L is used for linear motion valve such as globe valve or gate valve using spring return type diaphragm actuator or piston actuator. YT-2300L consists of the following components. Be sure that all the components are prepared.

1. YT-2300 main body
2. Feedback lever and lever spring
3. Flange nut (attached on the bottom of main shaft of YT-2300L body)
4. 4pcs of Hexagon head bolt M8x1.25P
5. 4pcs of M8 plate washer

YT-2300 installation example



YT-2300L installation example



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Installing YT-2300L with bracket

1. First of all, it is necessary to make proper bracket to attach on actuator yoke.

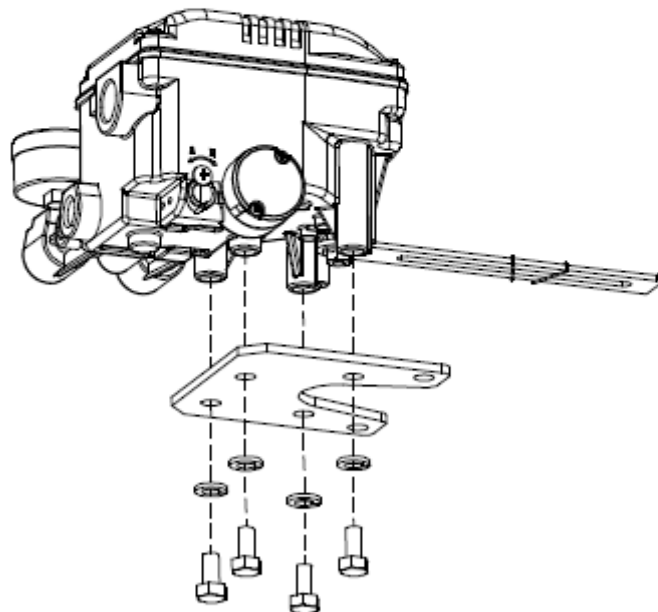
The most important things in making bracket are as follows.

1) YT-2300L feedback lever should be level at 50% of valve stroke. (Refer to no. 7 in this chapter.)

2) Feedback lever connection bar of actuator clamp should be connected at the position that valve stroke and the numbers carved on feedback lever is fitted. (Refer to no. 8 in this chapter.)

If the bracket meets the above conditions, YT-2300L is installed very easily.

2. Assemble YT-2300L and bracket with bolts. Use standard bolts in bolt holes on the backside of YT-2300L. The standard of bolt screw is M8x1.25P and other bolt standards are available as option. For details, contact our sales dept.



Installing YT-2300L with bracket

3. After assembling YT-2300L and bracket with bolts, attach it with using bolt holes of actuator yoke. But do not attach completely. There must be some space.



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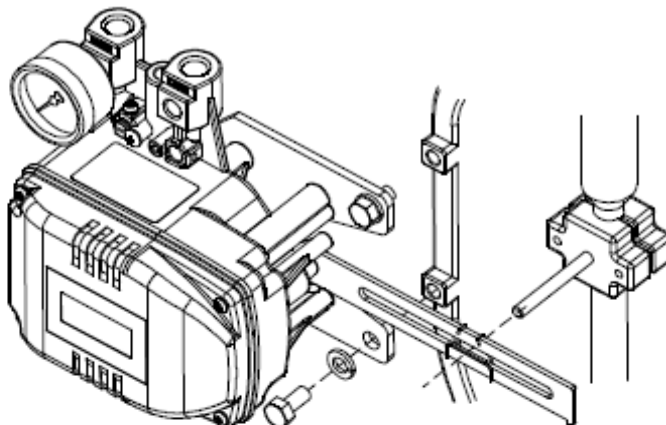
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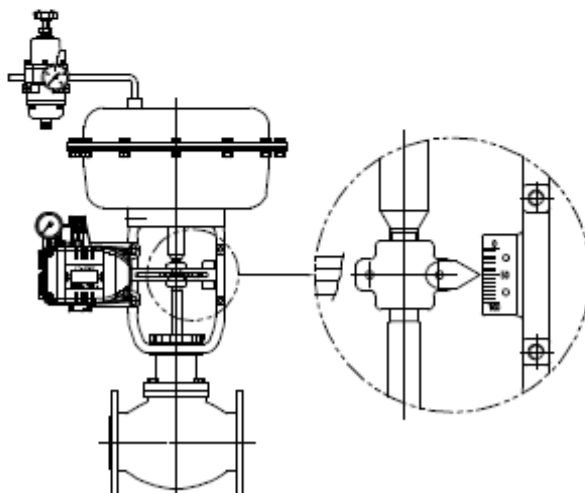
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4. Install bar connected with YT-2300L feedback lever on the actuator clamp. The slot length between YT-2300L feedback lever is 6.5mm, so the diameter of connection bar should be less than 6.3mm.



Installation of actuator clamp and connection bar

5. Connect air filter regulator with the actuator temporarily. Set supply pressure of air filter regulator in order that actuator clamp is positioned at 50% of valve stroke.



Connection of supply pressure pipe between actuator and air filter regulator



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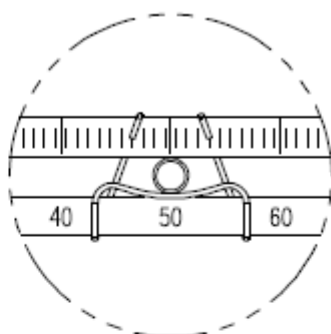
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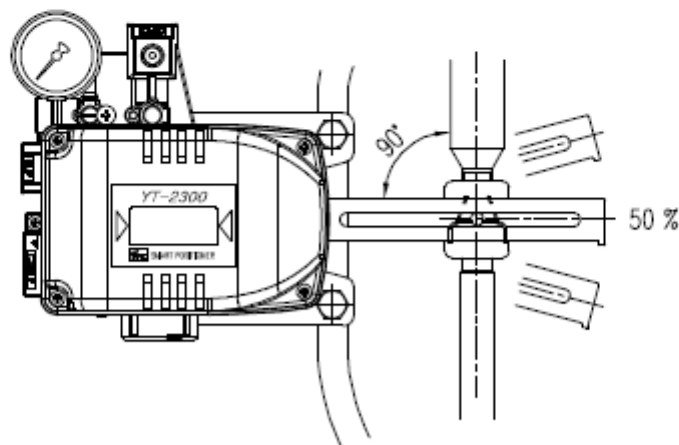
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6. Insert connection bar attached on actuator clamp into the slot of YT-2300L feedback lever. Ensure that inserting should be the following picture in order to reduce hysteresis.



The connection bar inserted correctly between feedback lever and lever spring

7. Check if YT-2300L feedback lever is level at 50% of valve stroke. If not, make it be level with moving bracket or feedback link bar. If YT-2300 is installed not being level at 50% of valve stroke, product linearity becomes worse.



Feedback lever being leveled correctly



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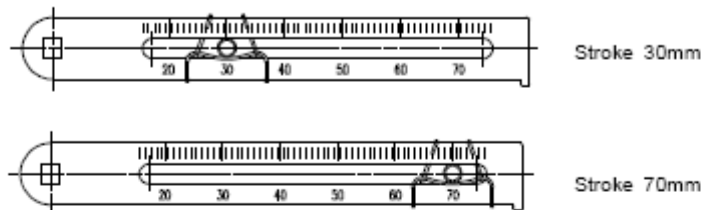
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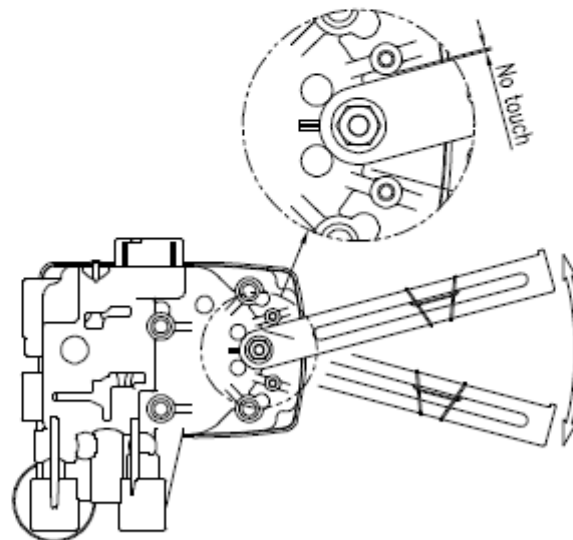
8. Check valve stroke. The numbers indicating stroke are carved on the YT-2300L feedback lever. Set connection bar attached on actuator clamp on the number on feedback lever applicable to valve stroke as the following picture. To set the connection bar and the number, move the bracket attached on YT-2300L or connection bar from side to side.



Installation position of connection bar for valve stroke

Note

After installation, operate valve from 0 stroke to 100% stroke with using air filter regulator on the actuator. When the stroke is both 0% and 100%, feedback lever should not be reached to the lever stopper on the backside of YT-2300. If feedback lever reaches to the lever stopper, move attachment position of YT-2300L to the direction becoming more distant from yoke center.



Check whether or not lever stopper and feedback lever is contacted

9. If YT-2300L is installed accurately as above procedures, lock the bolts and nuts of bracket and feedback lever connection bar completely.



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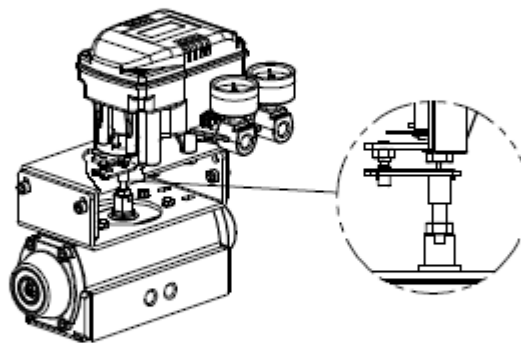
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YT-2300R installation

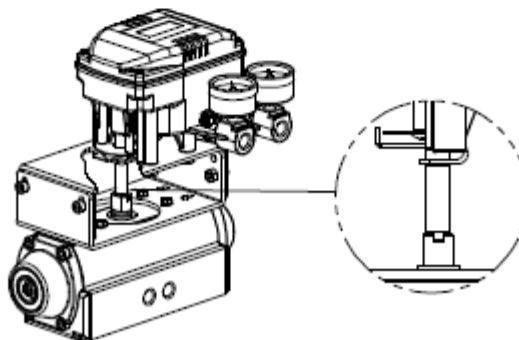
YT-2300R is used for rotary motion valve such as ball valve or butterfly valve using rack and pinion, scotch yoke or complex type actuator whose stem is rotated 90 degrees. YT-2300R consists of the following components.

1. YT-2300R main body
2. Fork lever and lever spring to attach on actuator
3. 1 set of bracket
4. 4pcs of Hexagon head bolt M8x1.25P
5. 4pcs of M8 plate washer

YT-2300R installation example



YT-2300R installation example of fork lever



YT-2300R installation example of Namur shaft



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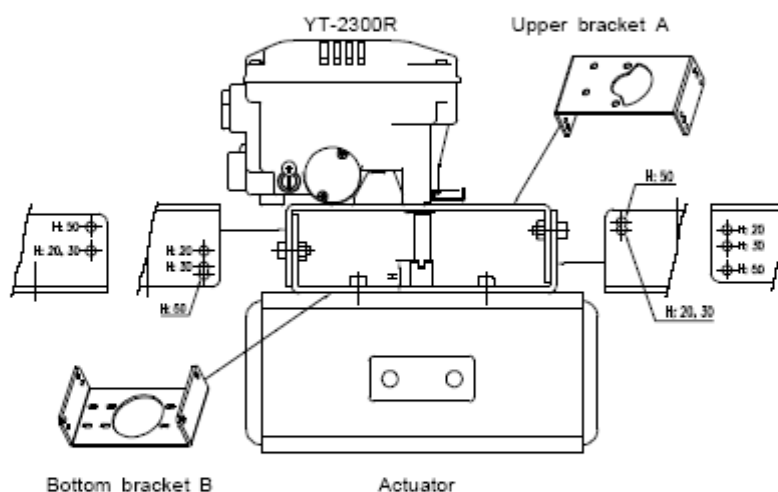


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Installing YT-2300R with bracket

YT-2300R is supplied with standard bracket. The bracket consists of 2 parts and can be used with Fork lever and Namur shaft. The bracket is assembled in the factory as based on 20mm of actuator stem height. But if actuator stem height is higher than that like 30mm, 50mm, reassemble the bracket adjusting to the height. Referring to the following table, check the hole positions.



Bracket assembly method by actuator stem height H

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

Ex) In case that H is 30mm, A-L should be locked in H:30 hole and B-L in H:20,30, A-R in H:30, B-R in H:20,30 with bolts.



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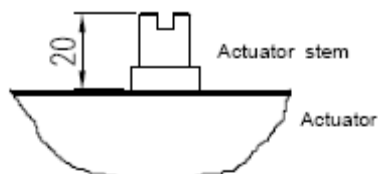
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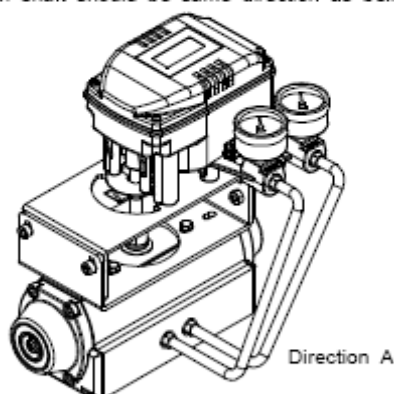
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1. Usual types of actuator stem height (H) are 20, 30 and 50mm. After checking H, assemble brackets as explained on the previous page. The bracket is set as 20mm type in the factory.



Actuator stem height (H=20mm)

2. Attach bracket to the actuator using hexagon head bolts or wrench bolts. Diameter of bracket bolt holes is 6mm. Use spring washers or any other equipment so as the bolts not to be loosened by vibration or impact. The direction of bracket is different by operating conditions, but normal direction is as following picture. That is, when the piping of actuator and YT-2300R is direction A, bracket hole and indicator attached on the bottom of YT-2300R main shaft should be same direction as being half circle.



Attachment direction of bracket and actuator

3. Set rotation position of actuator stem as initial zero point which is stroke 0%. In case of spring return type single actuator, since the actuator stem is always rotated at zero point without supply pressure, it is easy to check zero point. If the actuator is double acting, check that whether it is clockwise or counter clockwise or the rotation direction of actuator stem with using supply pressure.

4. Set actuator stem as initial zero point and install fork lever as the following picture. Ensure the position of initial zero point when actuator stem is clockwise or counter clockwise. Installation angle of fork lever should be about 45 degree based on the linear shaft. But the angle is not related to Namur shaft.



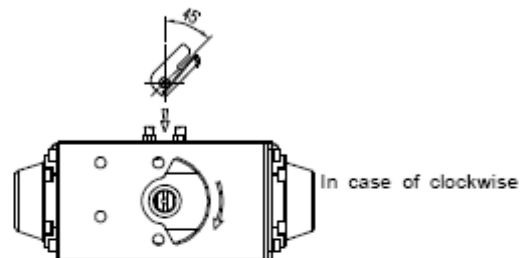
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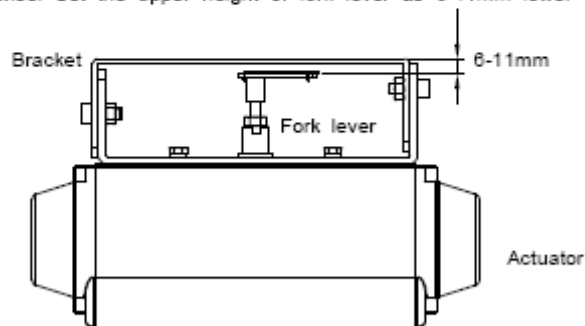
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Installation position of fork lever

5. If the fork lever position is set, lock check nuts assembled on the bottom of fork lever with turning clockwise. Set the upper height of fork lever as 6-11mm lower than bracket upper height.



Height of bracket, fork and fork lever

6. Attach YT-2300R to the bracket. Fix the clamping pin on the main shaft center of YT-2300R into the hole of fork lever and insert connection bar attached on the main shaft lever into fork lever slot to be locked fork lever spring. This is to fit the main shaft of YT-2300R and the center of actuator stem. If they are not fitted, product durability is getting worse due to too much force on the main shaft of YT-2300.



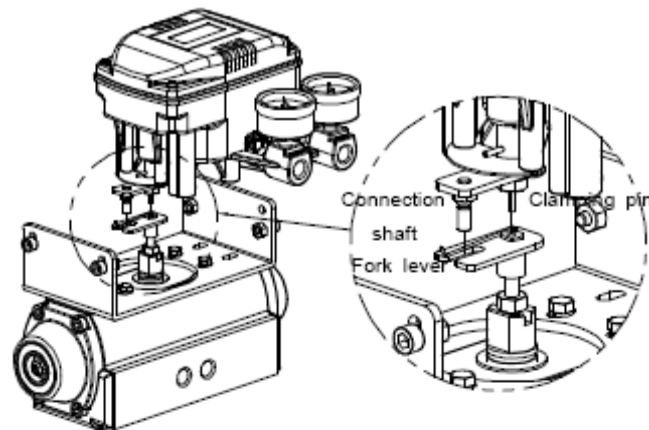
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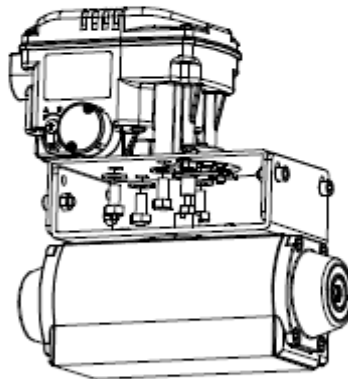
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Fitting the pin on the YT-2300R main shaft into fork lever hole

7. Fix YT-2300R base and the bracket with hexagon head bolts and plate washer. It is better to lock the bracket and YT-2300R after checking the position of YT-2300R inserting four bolts.



Assembly status of YT-2300R

Piping connection

Note

1. To prevent moisture, oil and dust from being led into the product, give careful consideration to the choice of supply pressure compressor and its system.
2. We recommend to attach filter or air filter regulator in front of supply port of YT-2300.



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Conditions of supply pressure

1. Dry air whose dew point is at least 10°C lower than that of ambient temperature.
2. Be free from solid particles as a result of being passed through 5 μ m or finer filter.
3. Not contain oil or lubricating oil.
4. Comply with ANSI/ISA-57.3 1975(R1981) or ISA 57.3-1975(R1981).
5. Not used beyond the range of 1.4 - 7 kgf/cm² (140 - 700 kPa).
6. Set supply pressure of air filter regulator as 10% higher than operating pressure of actuator of spring range pressure.

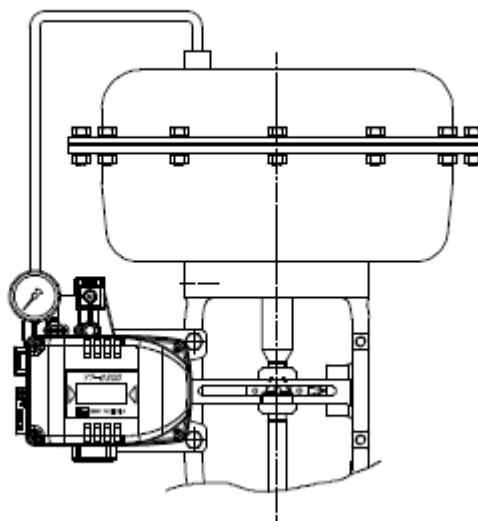
Conditions of pipe

1. Remove foreign objects inside of pipe.
2. Do not use squeezed or broken pipe.
3. To maintain flow rate of YT-2300, use the pipe whose inner diameter is more than 6mm (outer diameter 10mm).
4. Do not connect the pipe too long. It affects flow rate due to the friction inside the pipe.

Piping connection with actuator

Single acting actuator

YT-2300 series single acting type is set to use OUT1 port. Therefore, in case of using single acting type of spring return actuator, OUT1 port should be connected with supply pressure port of actuator.



Piping connection example of YT-2300L with single acting actuator



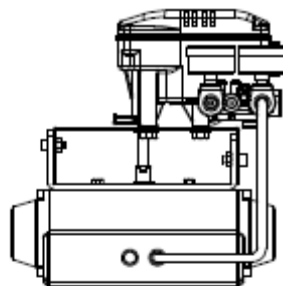
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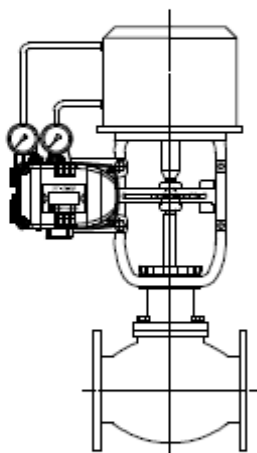
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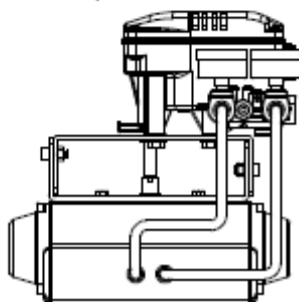
Piping connection example of YT-2300R with single acting actuator

Double acting actuator

In case of YT-2300 series double acting type, when input current signal, supply pressure is out from OUT1 port.



Piping connection example of YT-2300L with double acting actuator



Piping connection example of YT-2300R with double acting actuator



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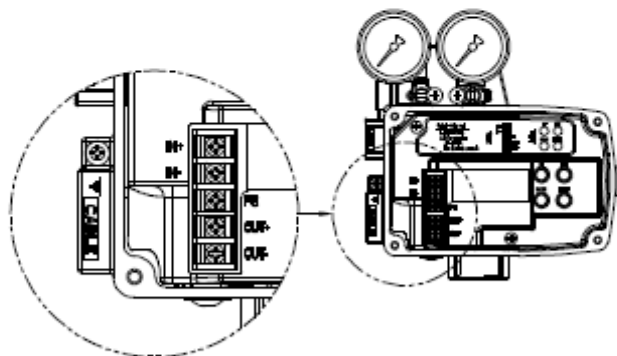
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Power connection

Note

1. Before connecting terminal, power must be shut off.
2. Use ring type terminal against oscillation, impact, etc.
3. YT-2300 series (except PTM included type) use DC 4-20mA as power. Minimum supply current is 3.2mA (standard type) and 3.8mA (Hart type) and Maximum supply current must not be exceeded 24mA.
4. In case of PTM type, additional power should be supplied to PTM separately. Supply voltage is 9-27V and must not be exceeded 30V.
5. In order to protect the product the ground terminals should be grounded.
6. Use twisted cable which conductor sectional area is 1.25mm² and is suitable for 600V as on conductor table of NEC Article 310. Outer diameter of cable should be 6.35-10mm. Use shield wire against electromagnetic wave and noise.
7. Do not install the cable near the equipment such as high-capacity transformer or motor generating noise.

The following is terminal part of YT-2300 series.



Terminal plate of YT-2300

Terminal connection of current input signal

1. Open cover by loosening 4pcs of M4 bolts of product cover.
2. Loosen terminal locking bolts of terminal plate receiving current input signal.



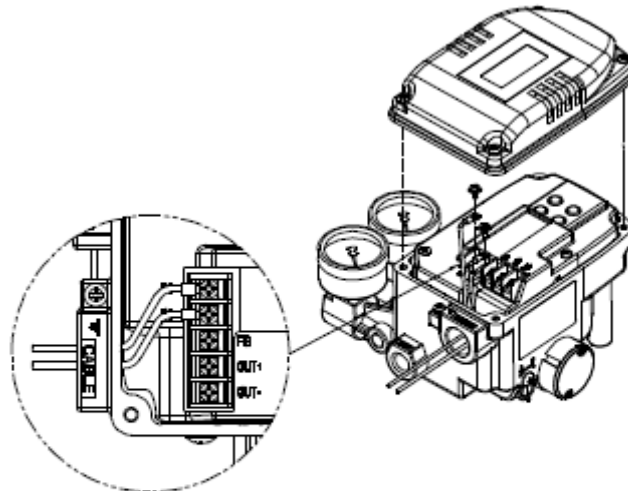
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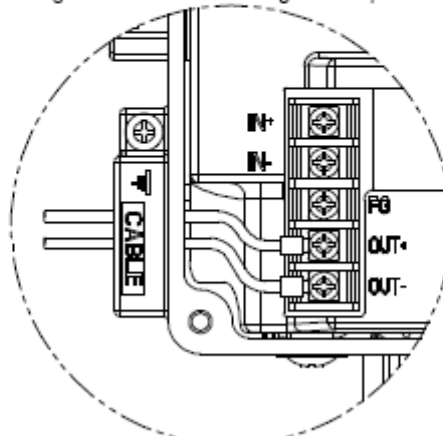


Terminal connection of current input signal

3. Insert a cable through cable connector in YT-2300.
4. Use ring type as cable terminal in order not to come out.
5. Insert terminal bolts in terminal holes of cable and lock them with + terminal and - terminal each on terminal plate. Tighten terminal bolts with 1.5Nm (15kgfcm) torque.
6. Be sure not to change the polarity of terminal.

Terminal connection of feedback signal

1. Open cover by loosening 4pcs of M4 bolts of product cover.
2. Loosen terminal locking bolts of feedback signal for position transmitter on terminal plate.



Terminal connection of transmitter



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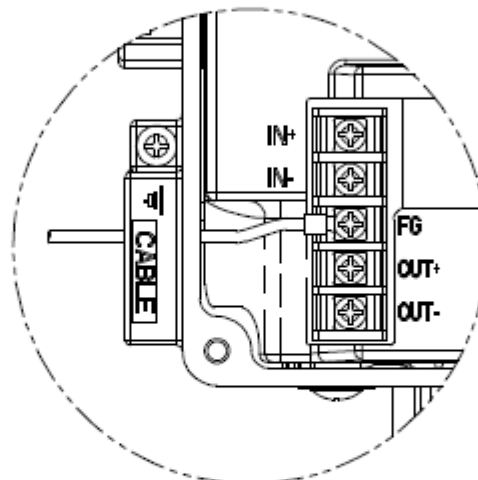
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3. Insert a cable through cable connector in YT-2300.
4. Use ring type as cable terminal in order not to come out.
5. Insert terminal bolts in terminal holes of cable and lock them with + terminal and - terminal each on terminal plate. Tighten terminal bolts with 1.5Nm (15kgfcm) torque.
6. Be sure not to change the polarity of terminal.

Inner terminal connection for ground

1. The ground is necessary for the safety of YT-2300 series and system.
2. There are inside terminal in the center of terminal plate and outside terminal beside outer cable entry. Using any ground terminal is available and resistance must be less than 1000hm.



Ground terminal connection

3. In case of using inside ground, open cover by loosening 4pcs of M4 bolts of product cover.
4. In order to maintain the ground safely, use ring type as ground cable terminal to prevent it coming out.

A/M switch (Auto/Manual switch)

There is A/M switch on the bottom of YT-2300. If this switch is set as auto, supply pressure is transmitted to actuator by the operation of YT-2300 and if it is set as manual, supply pressure of air filter regulator is transmitted to actuator regardless of YT-2300.



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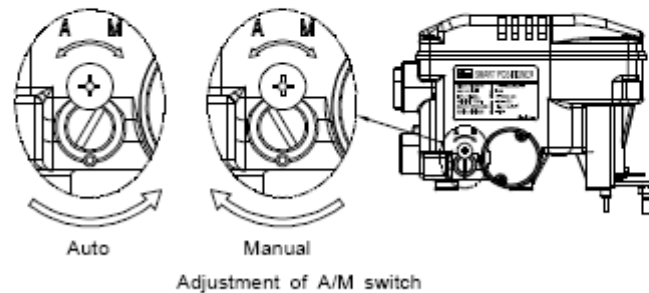


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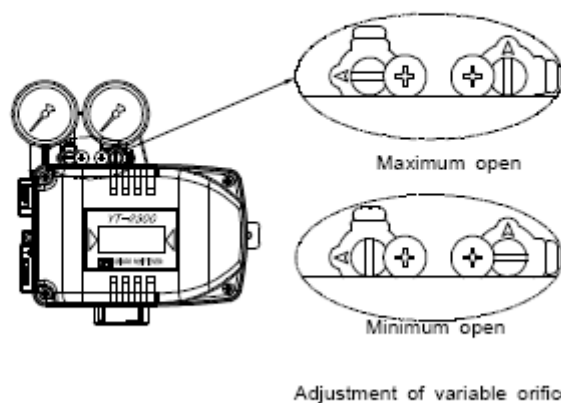
* When A/M switch is set as manual, ensure that too much pressure must not be transmitted to the actuator.

1. Check if the supply pressure of air filter regulator is too high.
2. Turn the switch clockwise and supply pressure of air filter regulator is transmitted to actuator.
3. If turn the switch counter-clockwise, YT-2300 is operated normally.



Variable orifice

The actuator volume is too small, hunting can be occurred. In this case, adjust variable orifice with using (-) driver, then hunting is prevented by reducing flow rate of supply pressure transmitting to actuator.





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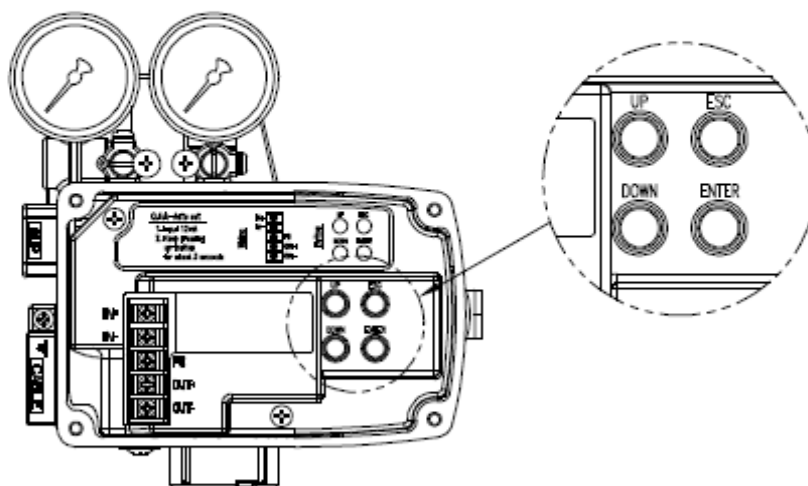
Auto calibration and Basic operations

Warning : Since this makes valve or actuator move, before auto calibration valve must be separated from entire system.

Button

YT-2300 Series perform various functions with using four buttons.

The shape and position of buttons are as follows.



<Enter> : It is used to go to Main menu, save adjusted parameter values or choose sub menus.

<ESC> : It is used to return to previous menu.

<UP> : It is used to move to another menu or change parameter values.

<DOWN> : It is used to move to another menu or change parameter values.



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RUN Mode

After connect power to YT-2300, the following is displayed on LCD in 6 seconds.



Run on the bottom line means that YT-2300 adjust valve stroke with receiving outside signal (4-20mA) and PV means the number on the LCD. In RUN mode, valve stroke is changed according to input signal. There are six types displayed in Run mode.

①	Run PV	Valve stroke of Process Value (%)
②	Run SV %	Input signal of Set Value (0 - 100%)
③	Run SV mA	Input signal of Set Value (4 - 20mA)
④	Run MV	Motor controlled variable of Manipulate Value (Digit)
⑤	Run Vel	Current valve speed (Digit)
⑥	Run Err	Difference between SV and PV (%)

In order to change display, push <ESC> and <UP> at same time. Whenever push the button, display is changed in order. If push <ESC> and <DOWN> simultaneously, the order is opposite and if push only <ESC>, display is returned to RUN mode.

First auto calibration

First auto calibration is usually used when YT-2300 has not been set, such as the occasion of initial setting with valve at valve company or replacement with other product in the field. In this case, entire parameters are set by using AUTO2 calibration.

Warning : When YT-2300 is installed on the valve in the field after setting, we recommend to use 'AUTO1 calibration' than AUTO2 calibration. Because optimum parameters are set by valve company, it is better that those registered parameters are not changed by AUTO1 calibration.



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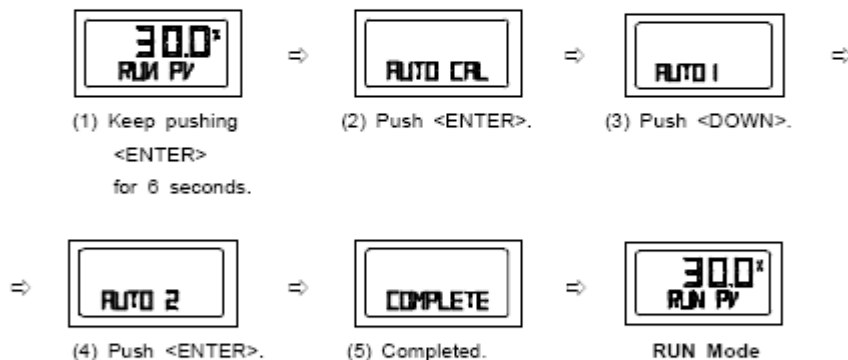
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- (1) Connect power. Any values between 4 to 20mA (DC) can be used for power. After connecting power 'READY 8, 5, 4, 3, 2, 1' message is appeared in order on LCD, which means preparing time to operate PCB circuit and parts. The following message is displayed in 8 seconds. Push <ENTER> for 8 seconds at RUN mode and AUTO CAL message is appeared.
- (2) Push <ENTER> and then AUTO1 mode is started.
- (3) Push <DOWN> and AUTO2 mode is displayed.
- (4) Push <ENTER> at AUTO2 mode. Auto 2 calibration is started and the next modes are displayed in order on LCD. Normally it takes 3-5 minutes for auto calibration in AUTO2 mode but it can be different by actuator's volume.
- (4) When Auto calibration is done, 'COMPLETE' message is appeared on LCD. After 4 seconds the procedure is returned to RUN mode and valve stroke by current input signal is displayed as percentage.
- (5) Zero, Span, PID parameters and RA/DA are automatically set when Auto 2 calibration is completed.



Entire modes and functions

Auto calibration (AUTO CAL)

The calibration of YT-2300 is simply performed by Auto calibration and there are 5 types of Auto calibration as AUTO1, AUTO2, AUTO3, BIAS, V_0.

AUTO1 calibration is useful for users' in the field and AUTO2 calibration is for valve company or initial parameters setting of YT-2300.



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It takes about 2-3 minutes for auto calibration and it can be different by actuator's volume. AUTO1, AUTO2 and AUTO3 calibration set RA/DA automatically.

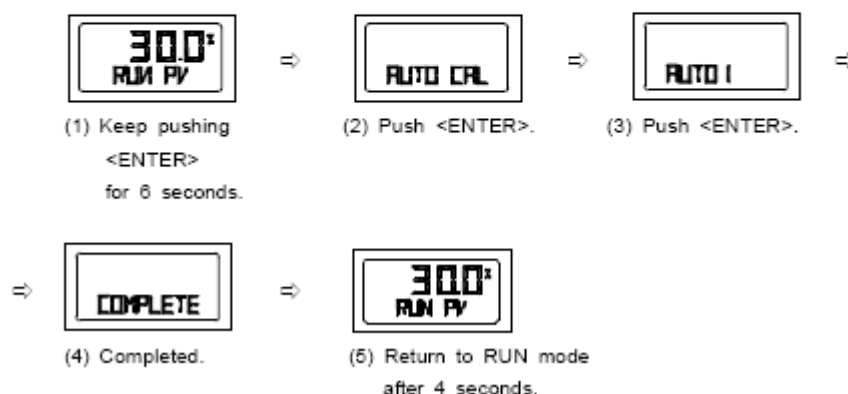
	Zero POINT	END POINT	KP, KI KD	BIAS	V_0	RA / DA
AUTO1	○	○	x	○	○	○
AUTO2	○	○	○	○	○	○
AUTO3	x	x	○	○	○	○
BIAS	x	x	x	○	x	x
V_0	x	x	x	x	○	x

Auto calibration types

Auto 1 calibration (AUTO1)

At this mode all parameters necessary to valve operation are set except KP, KI, KD. It is used to re-execute calibration by users in the field after being supplied YT-2300 whose parameters were all set by valve company.

- (1) Push <ENTER> for 6 seconds at RUN mode and AUTO CAL message is appeared.
- (2) Push <ENTER> and then AUTO1 mode is displayed.
- (3) Push <ENTER> again at AUTO1 mode and Auto1 calibration is started.
- (4) When Auto calibration is done, 'COMPLETE' message is appeared on LCD. After 4 seconds the procedure is returned to RUN mode and valve stroke by current input signal is displayed as percentage.





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Auto 2 calibration (AUTO2)

All parameters necessary to operate valve are set. This calibration is used when YT-2300 is first installed with valve. Refer to the chapter of first auto calibration.

Auto 3 calibration (AUTO3)

All parameters necessary to operate valve are set except zero and end point. This function is used to re-execute auto calibration without changing zero and end point after adjusting them manually.

- (1) Push <DOWN> at AUTO2 and AUTO3 is displayed.
- (2) Push <ENTER> and AUTO3 calibration is started. The next procedure of this calibration is as same as other calibrations.

BIAS calibration

BIAS means standard value of motor control that is used in positioner. It is affected by supply pressure, KP and other values and therefore it should be re-adjusted if supply pressure or KP is changed. Unless this value is correctly set, accuracy can be very low.

- (1) Push <DOWN> at AUTO3 mode and BIAS mode is displayed.
- (2) Push <ENTER> and BIAS calibration is started. The next procedure of this calibration is as same as other calibrations.

Velocity calibration (V_0)

This is the function to find the standard value to recognize accurate valve speed. Unless this value is correctly set, KI control can be slower or impossible. In order to check if this value is accurately set, push <ESC> at RUN mode and RUN Vel is displayed. At this time the number on the bottom line on LCD indicates the value close to zero. (After valve is stopped) Usually the number is between -2 to 2. If the number is over 5, execute this function again and reset V_0 value.

- (1) Push <DOWN> at BIAS mode and V_0 mode is displayed.
- (2) Push <ENTER> and V_0 calibration is started. The next procedure of this calibration is as same as other calibrations.



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Manual Mode

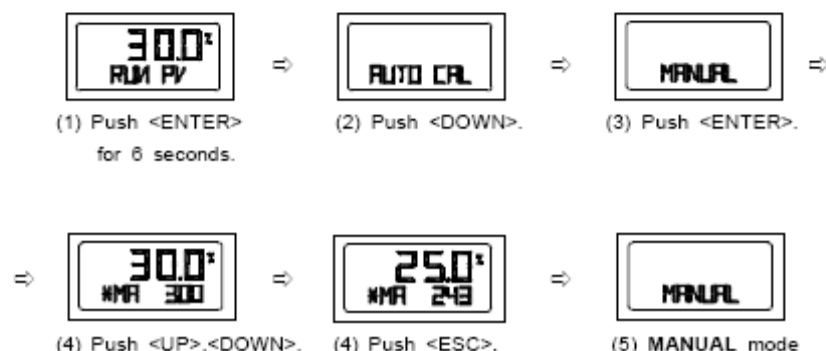
Manual mode is used to raise or lower the valve stem manually. At this mode valve stroke is adjusted by only operating buttons not by current input signal. This mode doesn't affect controlling data registered in YT-2300 and only makes to move valve stem up and down.

- (1) Keep pushing <ENTER> at RUN mode and AUTO CAL message is displayed.
- (2) Push <DOWN> and MANUAL mode is displayed.
- (3) Push <ENTER> again. Two lines on LCD are appeared. The upper one indicates valve stroke by percentage and the lower one indicates absolute value of inner resistance of YT-2300. *MA means that Manual mode is in operation.
- (4) Push <UP> or <DOWN> and valve stem moves up or down. Regardless of RA/DA, if push <UP>, valve stem moves up (in case of linear valve) and if push <DOWN>, valve stem moves down. In order to make the valve stem move fast, push <ENTER> with <UP>, <DOWN>.

Push <UP>.	Valve stem is up slowly.
Push <UP> + <ENTER> at the same time.	Valve stem is up quickly.
Push <DOWN>.	Valve stem is down slowly.
Push <DOWN>+<ENTER> at the same time.	Valve stem is down quickly.

Button operation for valve stem movement

- (5) Push <ESC> and MANUAL mode is displayed.





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Parameter mode (PARAM)

Parameter types

There are four types in parameter of Dead Zone, KP, KI, KD.

These values are reflected as soon as they are changed, therefore the appropriate values are found with checking valve's motion by real time.

Dead Zone (dEAdZONE)

This is the section of Error % that I control is not operated. If there are hunting or oscillation continuously due to the friction between stem and packing, they are prevented with this parameter.

KP

This is proportion constant value of correction that is correcting by Error %. If this value is too big, there can be hunting though it finds position by input signal. If the value is too small, accuracy gets worse.

KI

This is integral constant value adding or subtracting the correction that is correcting by Error % on previous correction signal. If this value is too big, there can be oscillation. If it is too small, the time to find the exact position gets longer.

KD

This is differential constant value adding previous correction signal with changing correction signal by Error % change rate.

Adjustment of Parameter

Dead zone (dEAdZONE)

- (1) Push <ENTER> at RUN mode for 8 seconds and AUTO CAL message is appeared.
- (2) Push <DOWN> twice and PARAM mode is displayed.
- (3) Push <ENTER> and dEAdZONE mode is displayed.
- (4) Push <ENTER> again and *EAdZONE message is appeared.
- (5) Adjust dEAdZONE value by <UP> or <DOWN>. Adjusted value is applied right away without additional operation, so users can easily check its adjustment by changing current input signal to YT-2300. It means that optimum control value is found by adjusting values during valve operation.



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(6) Push <ENTER> to save the value. +EAdZONE message is on LCD.

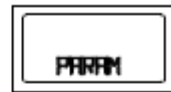
(7) Push <ESC> three times to return to RUN mode.



(1) Push <ENTER>
for 6 seconds.



(2) Push <DOWN> twice.



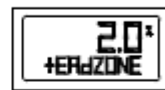
(3) Push <ENTER>.



(4) Push <ENTER>.



(5) Push <ENTER>
after adjustment
by <UP>, <DOWN>.



(6) Push <ESC>.



(7) Push <ESC> twice.



RUN Mode

KP

(1)-(3) Adjustment method and procedure is as same as dEAdZONE.

(4) Push <DOWN> at dEAdZONE mode and KP mode is displayed.

(5) Push <ENTER> and *KP message is on LCD.

(6) Adjust KP values with <UP> or <DOWN>. Adjusted value is applied right away without additional operation, so users can easily check its adjustment by changing current input signal to YT-2300. It means that optimum control value is found by adjusting values during valve operation.

(7) Push <ENTER> to save the value. +KP message is on LCD.

(8) Push <ESC>.

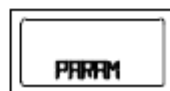
(9) Push <ESC> twice to return to RUN mode.



(1) Push <ENTER>
for 6 seconds.



(2) Push <DOWN> twice.



(3) Push <ENTER>.





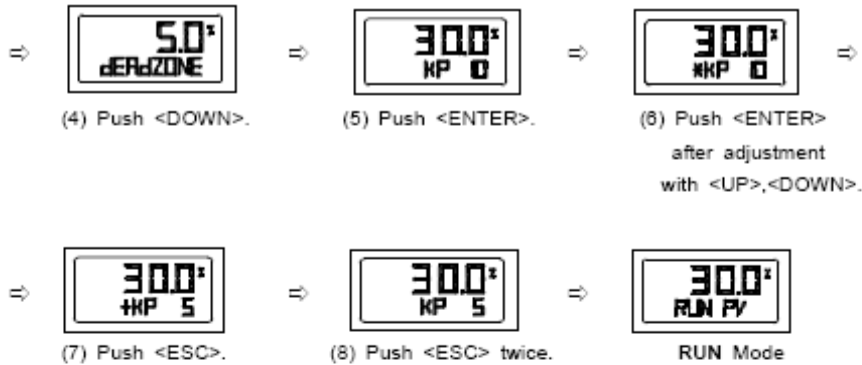
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KI

(1)-(3) Adjustment method and procedure is as same as dEAdZONE.

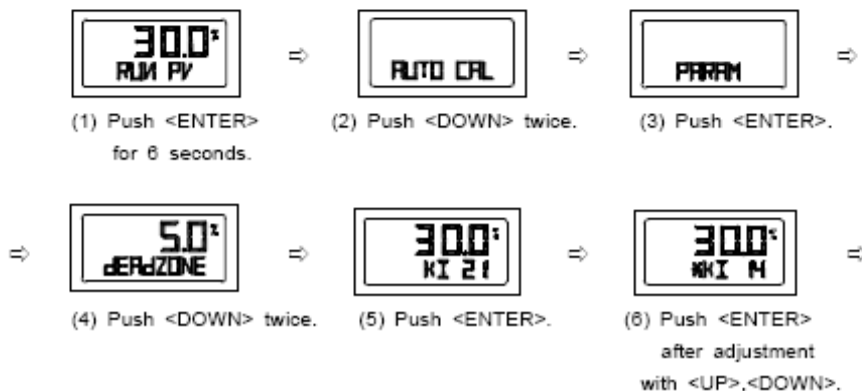
(4) Push <DOWN> twice at dEAdZONE mode, then KI mode is displayed.

(5) Push <ENTER> at KI mode and *KI message is appeared on LCD.

(6) Adjust KI value with <UP> or <DOWN>. Adjusted value is applied at once without additional operation, so users can easily check its adjustment by changing current input signal to YT-2300. It means that optimum control value is found by adjusting values during valve operation. Push <ENTER> to save the value and +KI message is on LCD.

(7) Push <ESC>.

(8) Push <ESC> twice to return to RUN mode.





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Kd

(1)-(3) Adjustment method and procedure is as same as dEAdZONE.

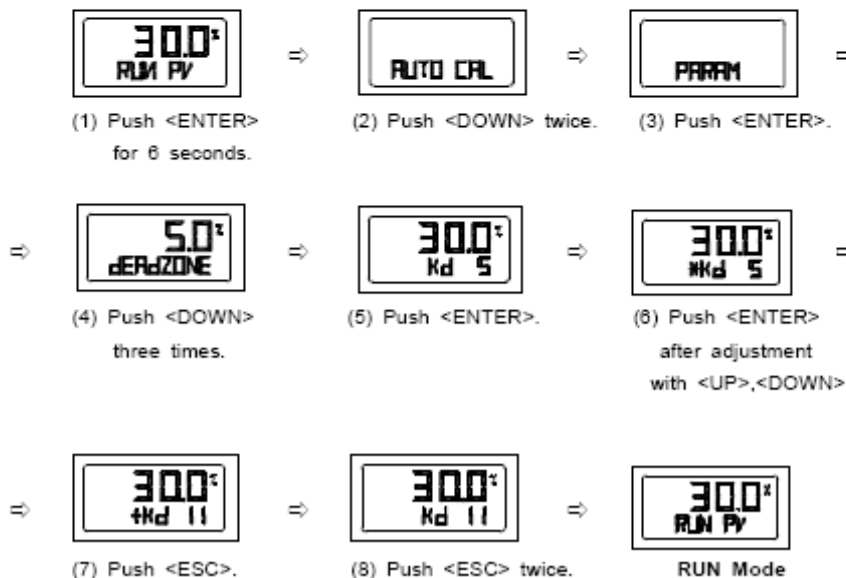
(4) Push <DOWN> three times at dEAdZONE mode, then Kd mode is displayed.

(5) Push <ENTER> at Kd mode and *Kd message is appeared on LCD.

(6) Adjust Kd value with <UP> or <DOWN>. Adjusted value is applied at once without additional operation, so users can easily check its adjustment by changing current input signal to YT-2300. It means that optimum control value is found by adjusting values during valve operation. Push <ENTER> to save the value and +Kd message is on LCD.

(7) Push <ESC>.

(8) Push <ESC> twice to return to RUN mode.





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HAND CAL

When auto calibration is started, YT-2300 sets zero point and end point based on full stroke.

Hand calibration types

PV_ZERO : Edit mode to change the zero point of valve.

PV_END : Edit mode to change the end point of valve.

TR_ZERO : Edit mode to change the zero point of transmitter.

TR_END : Edit mode to change the end point of transmitter.

Adjustment of valve zero point ((1)~(5)) and end point ((6)~(10))

(1) Push <ENTER> at RUN mode for six seconds and then AUTO CAL mode is displayed. Push <DOWN> three times, then HAND CAL mode is displayed.

(2) Push <ENTER> at HAND CAL mode and PV_ZERO mode is started.

(3) Push <ENTER> at PV_ZERO mode and *PZ mode is started. At this mode it is available to change valve zero point and valve stem moves automatically to current zero point. On LCD valve stroke is displayed as 0%. *PZ message indicating edit mode of zero point and inner value showing current zero point position are also displayed.

(4) Adjust Valve stem with pushing <UP>, <DOWN>. When valve stem is arrived at desirable zero point, save it with <ENTER>. +PZ message is appeared on LCD.

(5) Push <ESC> to return to PV_ZERO mode.

(Push <ESC> twice at this mode to return to RUN mode.)

(6) In order to change valve end point, push <DOWN> at PV_ZERO mode and PV_END mode is started.

(7) Push <ENTER> at PV_END mode and *PE mode is displayed. At this mode it is available to change valve end point and valve stem moves automatically to current end point. On LCD valve stroke is displayed as 100%. *PE message indicating edit mode of end point and inner value of end point are also displayed.

(8) Adjust valve stem with using <UP> or <DOWN>. When valve stem is arrived at desirable end point, save it with <ENTER>. +PE message is appeared on LCD.

(9) Push <ESC> to return to PV_END mode.

(10) Push <ESC> twice and RUN mode is displayed.

(Push <DOWN> at PV_END mode to go to TR_ZERO mode.)



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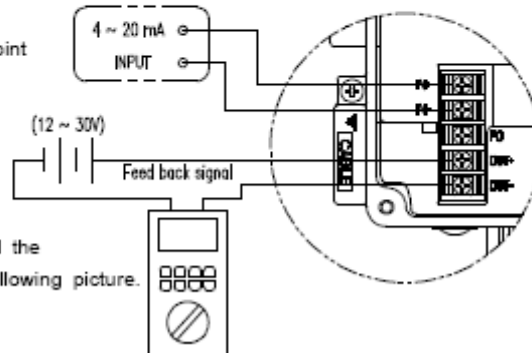
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Adjustment of zero point ((1)~(4)), end point ((5)~(9)) of transmitter

If valve zero point and end point are changed, transmitter is also changed automatically.

So usually there's no need that transmitter zero point and end point are adjusted by users, but if transmitter output signal is unstable, transmitter zero point and end point should be adjusted. The ammeter showing feedback signal is necessary and the connection should be done as following picture.





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- (1) Push <DOWN> at PV_END mode and then TR_ZERO mode is displayed.
- (2) Push <ENTER>. *R_ZERO mode is started and at this mode users can adjust zero point of transmitter. Valve stem is moved to zero point automatically.
- (3) Push <UP> or <DOWN>. The number on the above on LCD is changed and measured current value is changed accordingly on ammeter equipped outside. Adjust it to be 4mA and push <ENTER> to save it. +R_ZERO message is appeared.
- (4) Push <ESC>. TR_ZERO mode is displayed.
- (5) Push <DOWN> at TR_ZERO mode. Then TR_END mode is displayed.
(Push <ESC> twice to return to RUN Mode.)
- (6) Push <ENTER>. *TR_END mode is started and at this mode users can adjust end point of transmitter. Valve stem is moved to end point automatically.
- (7) Adjust measured current value to be 20mA on ammeter with <UP> or <DOWN>. Push <ENTER> to save it. +R_END message is appeared.
- (8) Push <ESC>. TR_END mode is displayed.
- (9) Push <ESC> twice at this mode to return to RUN mode.



(1) Push <DOWN>.



(2) Push <ENTER>.



(3) Push <ENTER>
after adjustment
with <UP>,<DOWN>.



(4) Push <ESC>.



(5) Push <DOWN>.



(6) Push <ENTER>.



(7) Push <ENTER>
after adjustment
with <UP>,<DOWN>.



(8) Push <ESC>.



(9) Push <ESC> twice.



RUN Mode



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Valve mode

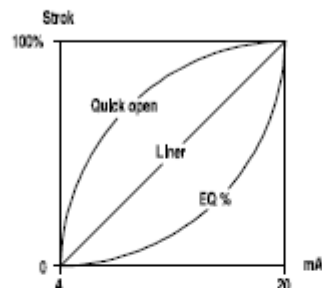
This mode is to adjust the various characteristics.

Action type (ACT)

It is set Direct Action (DA) and Reverse Action (RA).

Characteristics (CHAR)

It is set Characteristics. There are three types of valve characteristics, which are Linear (LIN), EQ% (EQ) and Quick Open (QO). The following is the example of three characteristic curves.



The example of three characteristic curves

User Characteristics (USER SET)

When specific characteristic which is not included in above characteristics is needed, it is available to make specific characteristic curve by choosing 16 points voluntarily according to field conditions and users' need.

Tight Shut Open (TSHUT OP)

This is to press down valve fully at any value around 20mA current input signal.

Tight Shut Close (TSHUT CL)

This is to close valve completely at setting value around 4mA input signal from outside.

Split Range Control (SPLIT)

This is to control entire stroke by three input signal of 4-20mA, 4-12mA and 12-20mA.

Adjustment of Acting type (ACT)

- (1) Push <ENTER> at RUN mode for six seconds and then AUTO CAL mode is displayed. Push <DOWN> four times to go into VALVE mode.
- (2) Push <ENTER> and ACT RA (in case of RA) is displayed.
- (3) Push <ENTER> again, then *ACT RA is displayed.
- (4) Adjust to *ACT DA with pushing <UP> or <DOWN> and save it with <ENTER>. +ACT DA message is on.



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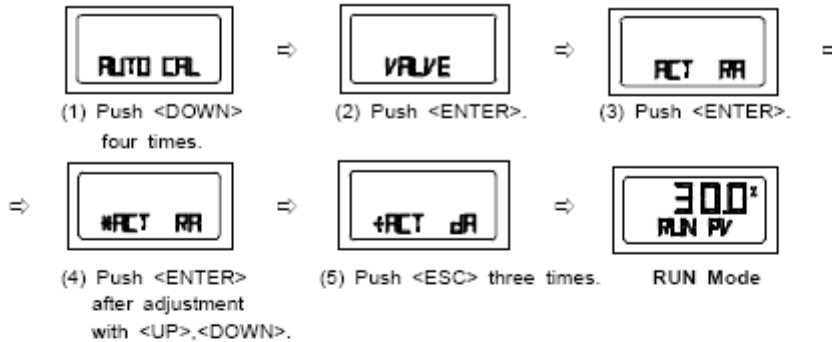
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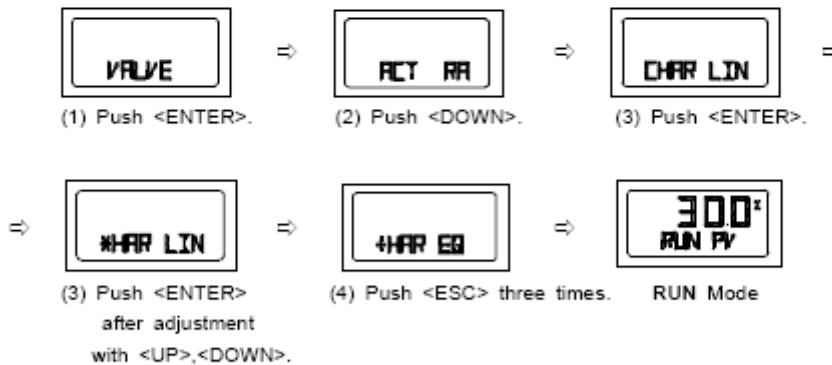
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(5) Push <ESC> three times to return to RUN mode.



Adjustment of Characteristics (CHAR)

- (1) Push <ENTER> at VALVE mode and then push <DOWN>. CHAR LIN (in case of linear characteristics) mode is displayed.
- (2) Push <ENTER>. *HAR LIN mode is displayed and characteristics can be adjusted at this mode.
- (3) Adjust Characteristics (ex: EQ) with pushing <UP> or <DOWN> and save it with <ENTER>. +HAR EQ is displayed.
- (4) Push <ESC> three times to return to RUN mode.



Adjustment of User Characteristics (USER SET)

- (1) Push <ENTER> at VALVE mode and ACT RA or ACT DA is displayed.
- (2) Push <DOWN> twice, then USER SET mode is started.
- (3) Push <ENTER>. *P0 SET mode is displayed and at this mode users can adjust the first point of characteristic in sixteen points. The number on LCD is valve stroke percentage set to P0.
- (4) Adjust valve stroke percentage with using <UP> or <DOWN>.



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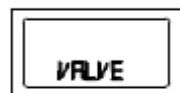
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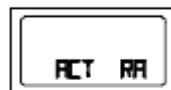
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- (5) Save it with <ENTER>. While P0 value is being saved, *P1 SET mode is displayed.
- (6) *P1 SET mode is to adjust the second point of characteristic in sixteen points. Adjustment method is as same as *P0 SET mode.
- (7) Save valve stroke percentage from P2 to P15 in the same way.
- (8) After adjustment of valve stroke percentage at *P15 SET mode, save it with <ENTER>.
- (9) +SER SET is displayed. Total sixteen points of valve stroke percentage are all set. Push <ESC> three times to return to RUN mode.



(1) Push <ENTER>.

⇒



(2) Push <DOWN> twice.

⇒



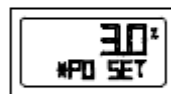
(3) Push <ENTER>.

⇒



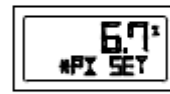
(4) Adjust with
<UP>, <DOWN>.

⇒



(5) Push <ENTER>.

⇒



(6) Set P1.

⇒



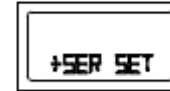
(7) Set P2-P15.

⇒



(8) Push <ENTER>.

⇒



(9) Push <ESC> three times.

⇒



⇒

RUN Mode



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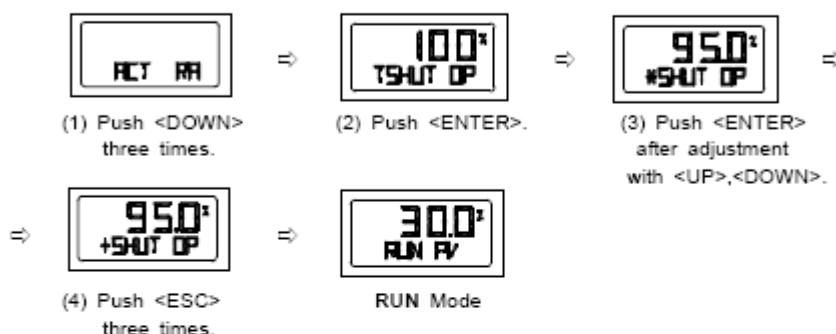


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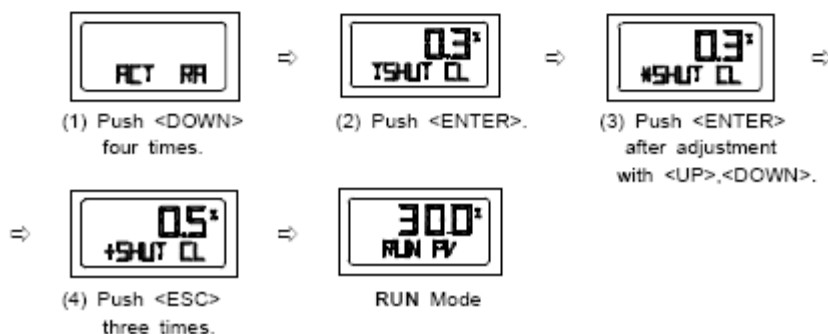
Adjustment of Tight Shut Open (TSHUT OP)

- (1) Push <ENTER> at VALVE mode and ACT RA or ACT DA is displayed. Push <DOWN> three times at this mode, then TSHUT OP is displayed.
- (2) Push <ENTER>. *SHUT OP mode is displayed and in this mode users can set stroke at the time of Tight Open. Initial setting is done as 100%, which means cancellation of this function. Adjust the value (ex : 95.0%) with pushing <UP> or <DOWN> and save it with <ENTER>. +SHUT OP is displayed.
- (3) Push <ESC> three times to return to RUN mode.



Adjustment of Tight Shut Close (TSHUT CL)

- (1) Push <ENTER> at VALVE mode and ACT RA or ACT DA is displayed. Push <DOWN> four times at this mode, then TSHUT CL is displayed.
- (2) Push <ENTER>. *SHUT CL mode is displayed and in this mode users can set stroke at the time of Tight Close. Initial setting is done as 0.3%. 0% means cancellation of this function. Adjust the value (ex : 0.5%) with pushing <UP> or <DOWN> and save it with <ENTER>. +SHUT CL is displayed.
- (3) Push <ESC> three times to return to RUN mode.





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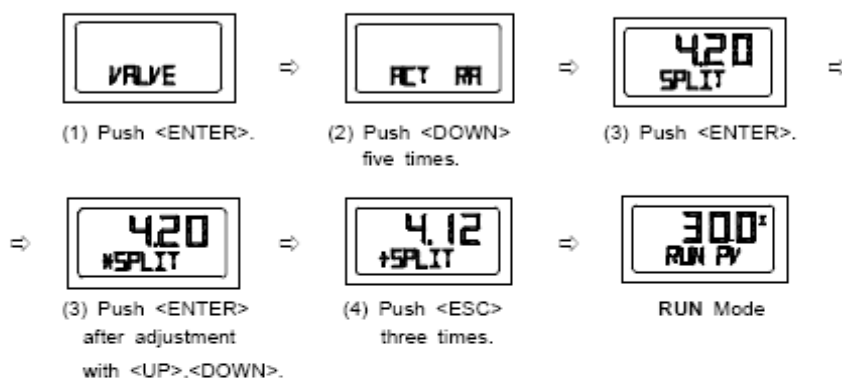


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Adjustment of Split Range (SPLIT)

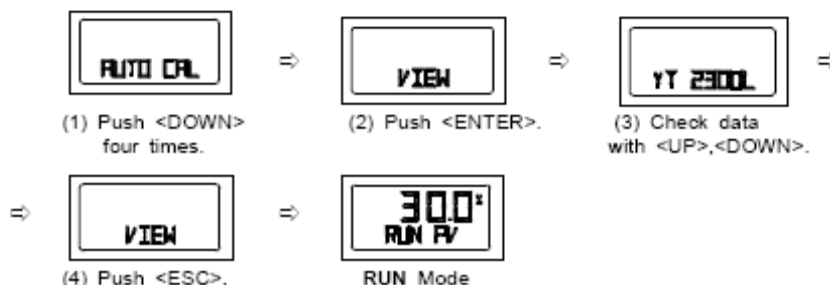
- (1) Push <ENTER> at VALVE mode and ACT RA or ACT DA is displayed.
- (2) Push <DOWN> five times and SPLIT mode is displayed. The numbers on LCD is the range of current signal input to YT-2300. 4-20mA current signal is set as standard.
- (3) Push <ENTER>. *SPLIT mode is displayed and input signal range can be adjusted. Adjust input signal range with <UP> or <DOWN> and save it with <ENTER>.
- (4) +SPLIT mode is displayed while saving adjusted range. Push <ESC> three times to return to RUN mode.



VIEW mode

This mode provides users with various information about YT-2300. And in this mode users can change valve stroke types displayed on LCD as % or numbers. Refer to the next table for information and description displayed on VIEW mode.

- (1) Push <DOWN> at AUTO CAL mode and VIEW mode is displayed.
- (2) Push <ENTER> at VIEW mode, then Information mode is started.
- (3) Check information with using <UP> or <DOWN> and push <ESC>.
- (4) Push <ESC> again to return to RUN mode.





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	Description
YT-2300L	Product model
VERSION	Main software version
HART V	Hart protocol version
POL Addr	Channel address used in Hart protocol
bIAS VI	BIAS value necessary to motor control (This variable is used by only manufacturer.)
0Y 0d	Total using time But if the product is used less than one minute from power-on to power-off, it is not added in total time.
FULL_OP	Full Open Time (Sec.) of valve
FULL_CL	Full Close Time (Sec.) of valve
VM NOR	Display type of valve stroke on LCD Either % or number is available.
Erro	Error or warning code currently occurred. Refer to the Code table.
VALUE I	Currently controlled I value (This variable is used by only manufacturer.)

Information checked on VIEW mode

Error and warning code

If there are any problems during YT-2300 operation, you can check the error and warning code at VIEW mode as follows.

Error code

This code is displayed when YT-2300 control gets impossible and code C, D is applied.

Warning code

This code is displayed when YT-2300 control is available but there's possibility of



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malfunction or low accuracy. Code B, F, G, H is applied.

Code	Description and cause	Measures
A	None	None
B	The range of Pv Span - Pv Zero is less than 500. ⇒ Operating angle of feedback is too small.	⇒ Adjust operating angle of feedback lever to be bigger (Refer P.13) and execute AUTO 1 calibration.
C	More than 10% error is continued over than one minute. ⇒ There's no valve movement. ⇒ Valve friction is getting too big. ⇒ Setting pressure of regulator is changed.	⇒ Check the setting pressure of air filter regulator. Adjust it to recommending pressure. Execute BIAS calibration.
D	I value is at I max or min limit. ⇒ Valve friction is changed. ⇒ Setting pressure of regulator is changed.	⇒ Check the setting pressure of air filter regulator. Adjust it to recommending pressure. Execute BIAS calibration.
E	None	None
F	Full Open, Close time is less than one second. ⇒ Actuator size is too small.	⇒ Use variable orifice. ⇒ Replace actuator to bigger one.
G	Pv is set below than 100. ⇒ Operating angle of feedback lever is set too big.	⇒ Adjust operating angle of feedback lever to be smaller (Refer P.13) and execute AUTO 1 calibration.
H	Pv is over than 4000. ⇒ Operating angle of feedback lever is set too big.	⇒ Adjust operating angle of feedback lever to be smaller (Refer P.13) and execute AUTO 1 calibration.

Error/warning code



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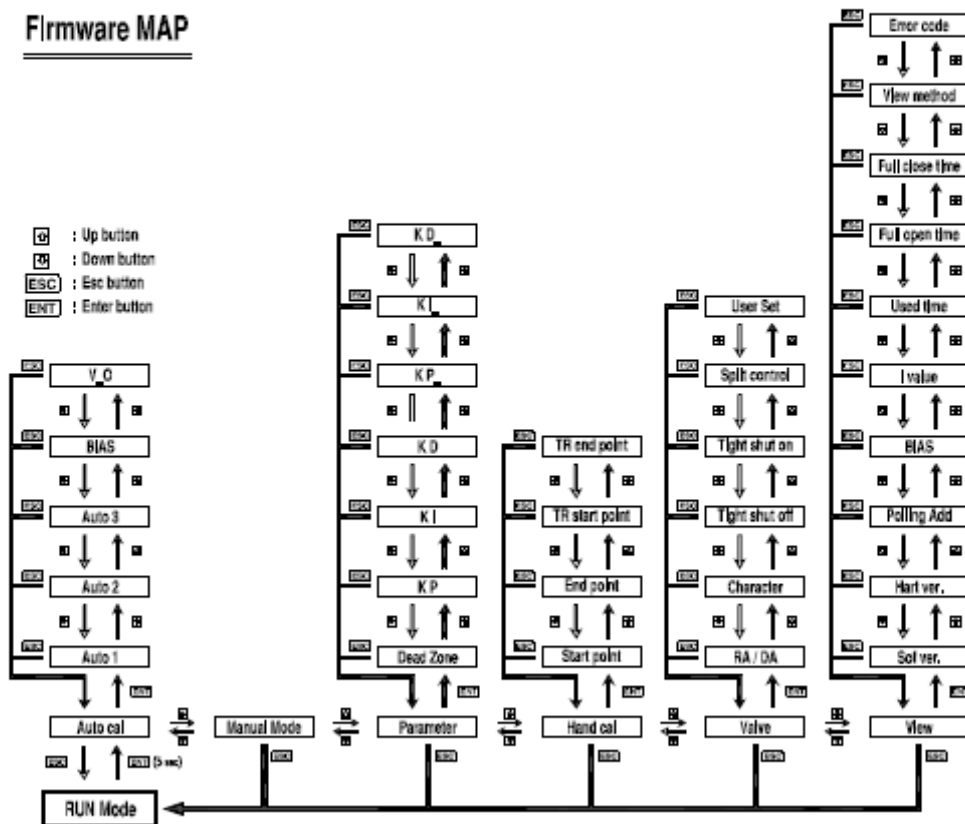


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Main software map

Firmware MAP



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