

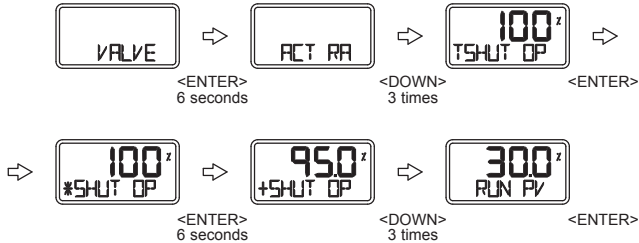


### Tight Shut Open (TSHUT OP)

This allows the user to fully open valve at input values around 20 mA.

#### Adjustment of Tight Shut Open (TSHUT OP)

- To adjust Tight Shut Open, scroll with <DOWN> at VALVE menu and select TSHUT OP.
- Push <ENTER> and \*SHUT OP mode is displayed. In this mode users can set stroke at the time of Tight Open. Initial setting is done as 100% which means the TSHUT option is disabled. Adjust the value (ex: 95.0%) by pushing <UP> or <DOWN> and save with <ENTER>. +SHUT OP is displayed.
- Push <ESC> to exit TSHUT OP mode.

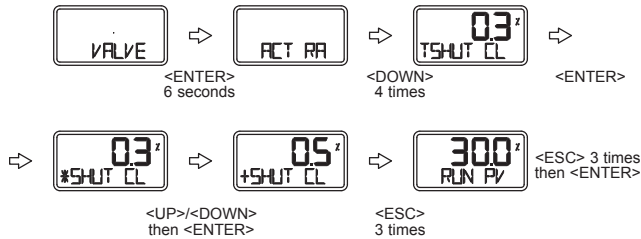


### Tight Shut Close (TSHUT CL)

This allows the user to completely close valve at input values around 4 mA.

#### Adjustment of Tight Shut Close (TSHUT CL)

- To adjust Tight Shut Close, scroll with <DOWN> at VALVE menu and select TSHUT CL.
- Push <ENTER> and \*SHUT CL mode is displayed. In this mode users can set stroke at the time of Tight Close. Initial setting is done as 0.3%. 0% means the TSHUT option is disabled. Adjust the value (ex: 0.5%) by pushing <UP> or <DOWN> and save with <ENTER>. +SHUT CL is displayed.
- Push <ESC> to exit TSHUT CL mode.

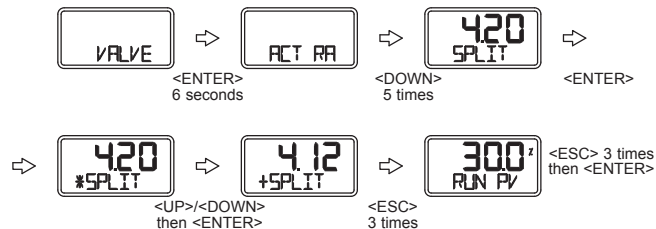


### Split Range Control (SPLIT)

This allows the user to control entire stroke with input signals of 4 to 20 mA, 4 to 12 mA or 12 to 20 mA.

#### Adjustment of Split Range (SPLIT)

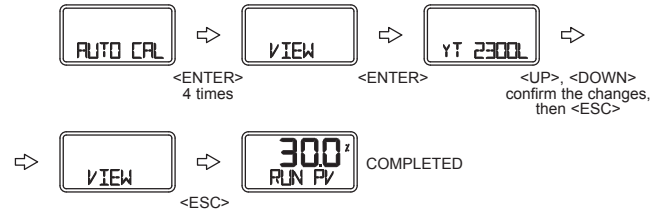
- To change Split Range, scroll with <DOWN> at VALVE menu and select SPLIT.
- Push <ENTER>. \*SPLIT mode is displayed. The numbers on the LCD are the range of current signal input to the positioner. 4.20 indicates 4-20 mA, 4.12 indicates 4-12 mA, and 12.20 indicates 12-20 mA setting.
- Select desired Split Range and save with <ENTER>.
- Push <ESC> to exit SPLIT mode.



### VIEW Mode

This mode provides users with various information about the Series 185 and 285 positioners. In this mode, users can change the valve stroke types displayed on LCD to % or numbers. Refer to the next table for information and description displayed on VIEW mode.

- Press and hold <ENTER> at RUN mode for 6 seconds and AUTO CAL message appears.
- Scroll with <DOWN> and select VIEW menu.
- Push <ENTER> and check information using <UP> or <DOWN>.
- Push <ESC> to exit VIEW mode.



	Description
YT-2500L	Positioner model
VERSION	Main software version
HART V	HART Protocol version
POL Addr	Channel address that is used in HART Protocol
BIAS VI	BIAS value for motor/piezo valve control. Can be adjusted only by manufacturer.
OY 0d	Total used time duration. If a unit was used less than 1 minute, the time does not accumulate.
FULL_OP	Time elapsed for valve to fully open.
FULL_CL	Time elapsed for valve to fully close.
VM NOR	Display type of valve stroke on LCD (either in percentage or value).
Erro	Display error code or warning message <Figure XX>.
VALUE I	Current I-Value. Can be adjusted only by manufacturer.
ABS	Display absolute resistance value.

#### Information Checked on VIEW Mode

### Error and Warning Code

If there are any problems during Series 185 and 285 positioner operation, you can check the error and warning code at VIEW mode as follows:

#### Error Code

This code is displayed when the Series 185 and 285 positioner control becomes impossible. Code C, D applies.

Error Code	Code Description and Cause	Action
MT ERR L	Positioner is improperly installed. Positioner lever is not parallel to the ground at 50% point. Lever is at lower position than actual 50% point.	Re-install/mount the positioner. Make sure the feedback lever does not touch the stopper at both 0 and 100%.
MT ERR H	Positioner is improperly installed. Positioner lever is not parallel to the ground at 50% point. Lever is at lower position than actual 50% point.	Re-install/mount the positioner. Make sure the feedback lever does not touch the stopper at both 0 and 100%.
CHK AIR	Valve does not operate when positioner receives "Full Open" signal during auto calibration.	Check if supply pressure is stable and appropriate.
RNG ERR	Operating angle is too small due to improper mounting of positioner.	Adjust bracket so the positioner can be mounted closer to actuator.
C	Error 10% or above persists more than 1 minute. No valve movement. Friction of valve is too large. Setting pressure of actuator changes.	Perform BAS calibration. Check setting pressure of actuator and set the pressure as recommended.
D	I-Value reaches at maximum or minimum limit point. Friction of valve changes. Setting pressure of actuator changes.	Perform AUTO calibration. Check setting pressure of actuator and set the pressure as recommended.

### Valve Mode

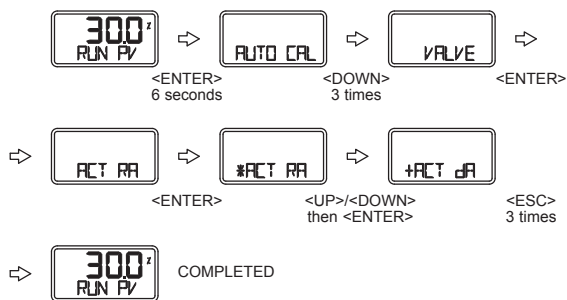
This mode adjusts the various characteristics.

### Action Type (ACT)

It can be set to Direct Action (DA) or Reverse Action (RA).

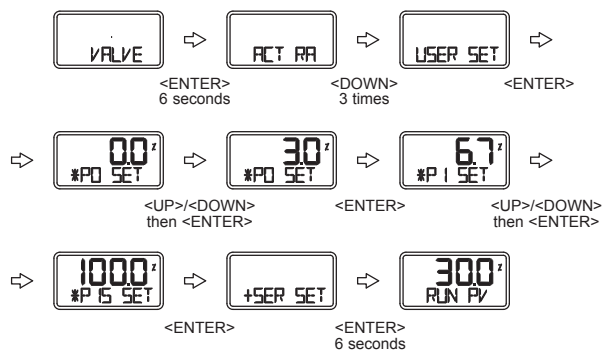
### Adjustment of Acting Type (ACT)

1. Press and hold <ENTER> at RUN mode for 6 seconds and AUTO CAL message appears.
2. Scroll with <DOWN> until VALVE mode is displayed.
3. Push <ENTER> and ACT RA (in case of Reverse Acting) is displayed.
4. Push <ENTER> and \*ACT RA is displayed.
5. Adjust to \*ACT DA by pushing <UP> or <DOWN> and save it with <ENTER>. +ACT DA message appears.
6. Push <ESC> to exit ACT RA mode.



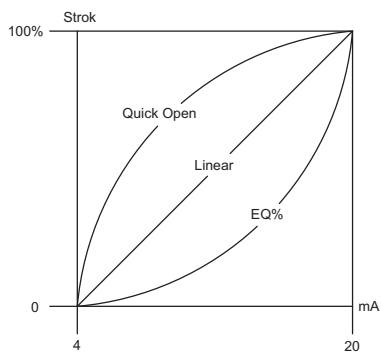
### Adjustment of User Characteristics (USER SET)

1. Push <ENTER> at VALVE mode and scroll with <DOWN> to select USER SET.
2. Push <ENTER>. \*PO SET mode is displayed. In this mode, users can adjust the first point of characteristic in 16 points. the number on the LCD is the valve stroke percentage set to P0.
3. Adjust the valve stroke percentage using <UP> or <DOWN>.
4. Save with <ENTER>. While P0 value is being saved, \*P1 SET mode is displayed.
5. \*P1 SET mode is used to adjust the second point characteristic in 16 points. Adjustment method is the same as P0\* SET mode.
6. Continue steps from P2 to P15.
7. After adjusting valve stroke percentage at \*P15 SET mode, save with <ENTER>.
8. +SER SET is displayed. All sixteen points of valve stroke percentage are set.
9. Push <ESC> to exit USER SET mode.



### Characteristics (CHAR)

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



### Adjustment of Characteristics (CHAR)

1. To change linear characteristics, scroll with <DOWN> at VALVE menu and select CHAR LIN (in case of linear characteristics).
2. Push <ENTER>. \*HAR LIN mode is displayed and characteristics can be set to LIN, EQ, QO or USR.
3. Adjust characteristics (ex: EQ) by pushing <UP> or <DOWN> and save it with <ENTER>. + HAR EQ is displayed.
4. Push <ESC> to exit CHAR LIN mode.

### User Characteristics (USER SET)

When a specific characteristic is needed but not included in the above characteristics, the user can make a specific characteristic curve by choosing 16 points voluntarily.

## Parameter Mode (PARAM)

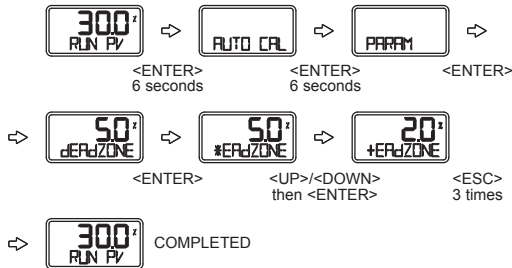
### Parameter Types

There are four parameter modes: Dead Zone, KP, KI, and KD. These values are reflected as soon as they are changed, therefore the appropriate values are found by checking the valve's motion in real time.

### Adjustment of Dead Zone (dEAdZONE)

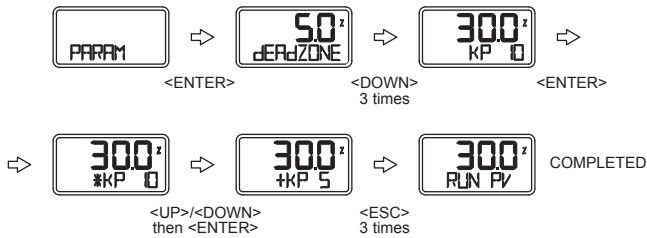
This is the range of error % that the positioner is not adjusted. Hunting or oscillation due to friction between the stem and packing is prevented by this parameter.

1. Press and hold <ENTER> at RUN mode for 6 seconds and AUTO CAL message appears.
2. Scroll with <DOWN> until PARAM mode is displayed.
3. Push <ENTER> and dEAdZONE mode is displayed.
4. Push <ENTER> again and \*EAdZONE message appears.
5. Adjust dEAdZONE value by pushing <UP> or <DOWN>. Adjusted value is applied immediately without additional operation. Users can easily check its adjustment by changing the current input signal to the positioner. Optimum control value is found by adjusting values during the valve operation.
6. Push <ENTER> to save the value. +EAdZONE message appears on LCD.
7. Push <ESC> to exit dEAdZONE mode.



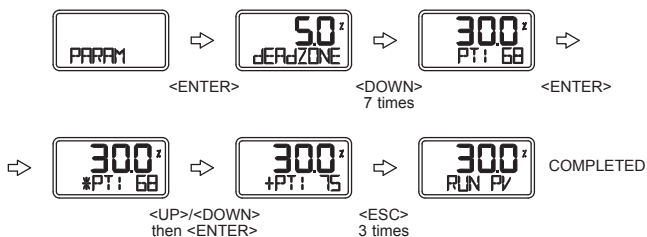
### KP

1. Press and hold <ENTER> at RUN mode for 6 seconds and AUTO CAL message appears.
2. Scroll with <DOWN> until PARAM mode is displayed.
3. Push <ENTER> and dEAdZONE mode is displayed.
4. Scroll with <DOWN> until KP mode is displayed.
5. Push <ENTER> at KP mode and \*KP message appears on LCD.
6. Adjust KP value with <UP> or <DOWN>. Adjusted value is applied immediately without additional operation. Users can easily check its adjustment by changing the current input signal to the positioner. Optimum control value is found by adjusting the values during valve operation.
7. Push <ENTER> to save the value and +KP message appears on LCD.
8. Push <ESC> to exit KP mode.



### PT

1. Press and hold <ENTER> at RUN mode for 6 seconds and AUTO CAL message appears.
2. Scroll with <DOWN> until PARAM mode is displayed.
3. Push <ENTER> and dEAdZONE mode is displayed.
4. Scroll with <DOWN> until PT mode is displayed.
5. Push <ENTER> at PT mode and \*PT message appears on LCD.
6. Adjust PT value with <UP> or <DOWN>. Adjusted value is applied immediately without additional operation. Users can easily check its adjustment by changing the current input signal to the positioner. Optimum control value is found by adjusting the values during valve operation.
7. Push <ENTER> to save the value and +PT message appears on LCD.
8. Push <ESC> to exit KP mode.



## HAND CAL

When auto calibration is started, Series 185 and 285 positioners set zero points and end points based on full stroke. HAND CAL allows for user defined zero and end points.

### Hand Calibration Types

- PV\_ZERO: Edit mode to change the zero point of valve.
- PV\_END: Edit mode to change the end point of a valve.
- TR\_ZERO: Edit mode to change the zero point of transmitter.
- TR\_END: Edit mode to change the end point of transmitter.

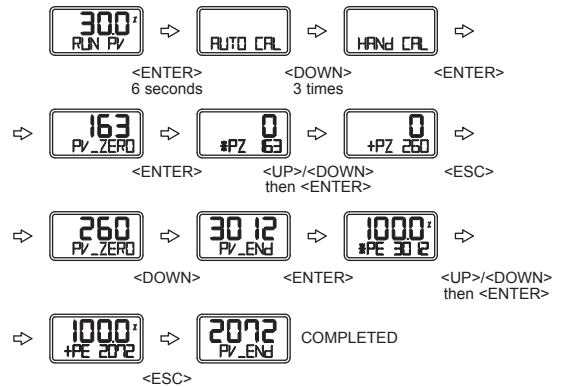
Adjustment of valve zero point (1 to 5) and end point (6 to 10).

### PV\_ZERO

1. Press and hold <ENTER> at RUN mode for 6 seconds and AUTO CAL message appears.
2. Scroll with <DOWN> until HAND CAL mode is displayed.
3. Push <ENTER> and PV\_ZERO mode is displayed.
4. Push <ENTER> at PV\_ZERO mode and \*PZ mode is started. The valve stem will move automatically to the current zero point. On the LCD, the valve stroke is displayed as 0%. \*PZ indicates the zero point is ready to be set.
5. Adjust valve stem by pushing <UP> or <DOWN>. When valve stem is at the desired zero point, save it by pushing <ENTER>.
6. Push <ESC> to exit PV\_ZERO mode.

### PV\_END

1. To change valve end point, scroll with <DOWN> at HAND CAL menu and select PV\_END.
2. Push <ENTER> at PV\_END mode and \*PE mode is displayed. The valve stem will move automatically to the current end point. On the LCD, the valve stroke is displayed as 100%. \*PE indicates the end point is ready to be set.
3. Adjust valve stem by pushing <UP> or <DOWN>. When the valve stem is at the desired end point, save it by pushing <ENTER>.
4. Push <ESC> to exit PV\_END mode.



## Auto Calibration and Basic Operations

**CAUTION** Since this makes the valve or actuator move, before auto calibration, the valve must be separated from the entire system.

### Buttons Operations

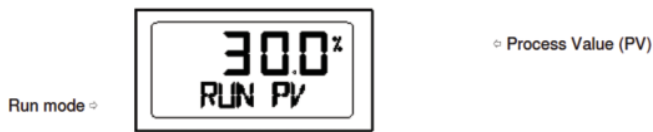
Series 185 and 285 positioners perform various functions using four buttons. The position of the buttons is shown below:

Button	Functions
<ENTER>	Enter to Main Menu and Sub-Menus, Save Adjusted Parameter Values, etc.
<ESC>	Return to Previous Menu
<UP> & <DOWN>	Move to Next Menu, Change Parameter Values, etc.

### RUN mode

After connecting the power to the positioner, the following is displayed on the LCD in 6 seconds.

RUN on the bottom line means that the Smart Positioner adjusts valve stroke based on an outside signal (4 to 20 mA) and PV refers to the number on the LCD. In RUN mode, valve stroke is changed according to input signal.



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 - 20 mA)
4	Run MV	Manipulate Value	Motor/Piezo Valve Manipulate Valve (Digit)
5	Run Vel	Velocity	Current Valve Stem's Velocity (Digit)
6	Run Err	Error	Difference between SV and PV (%)

### First Auto Calibration

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

**Notice:** When the positioner is installed on the valve in the field after setting, we recommend using AUTO1 calibration rather than AUTO2 calibration. This is because the AUTO 2 calibration parameters have been factory set to the optimum settings.

	Zero Point	End Point	KP, KI, KD	RA/DA
AUTO1	°	°	x	x
AUTO2	°	°	°	°
AUTO3	x	x	°	°

### KP

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

### KI

This is an integral constant value adding or subtracting the correction that is corrected error % on the 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 increases.

### KD

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

### RA/DA

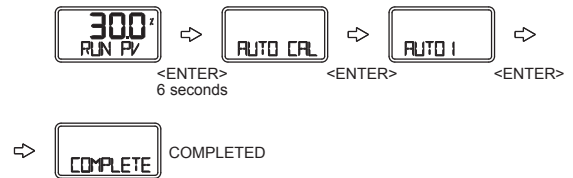
Direct acting (DA) or Reverse acting (RA).

## Auto Calibration Types

### Auto 1 Calibration (AUTO1)

In this mode, all parameters necessary for valve operation are set except KP, KI, KD and RA/DA. It is used to re-execute calibration by users in the field after being supplied the positioner unit, whose parameters were set by the valve company.

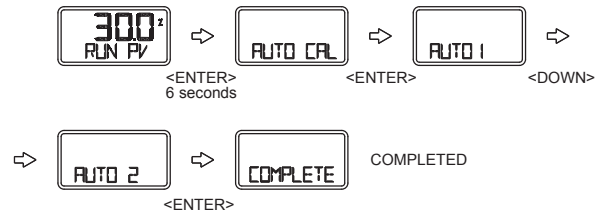
1. Press and hold <ENTER> for 6 seconds in RUN mode and AUTO CAL message should appear.
2. Push <ENTER> and AUTO CAL menu is displayed.
3. Push <ENTER> at AUTO1 mode and Auto 1 calibration is started.
4. When Auto 1 calibration is done, 'COMPLETE' message will appear on the LCD. After 4 seconds the procedure returns to RUN mode.



### Auto 2 Calibration (AUTO2)

All parameters necessary to operate valve are set. This calibration is used when the positioner is first installed with valve. Refer back to First Auto Calibration.

1. Press and hold <ENTER> for 6 seconds in RUN mode and AUTO CAL message should appear.
2. Push <ENTER> and AUTO CAL menu is displayed.
3. Push <DOWN> at AUTO CAL and select AUTO 2.
4. Push <ENTER> at AUTO2 mode. Auto 2 calibration is started and the next modes are displayed in order on the LCD. Normally it will take 3 to 5 minutes for auto calibration in AUTO2 mode. Duration may vary based on actuators volume.
5. When Auto calibration is done, 'COMPLETE' message appears on the LCD. After 4 seconds the procedure is returned to RUN mode. Zero, Span, PID parameters and RA/DA are automatically set when Auto 2 calibration is completed. **Below: Entire Modes and Functions**



### 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 the zero and end point after adjusting them manually.

1. Press and hold <ENTER> for 6 seconds in RUN mode and AUTO CAL message should appear.
2. Push <ENTER> and AUTO CAL menu is displayed.
3. Push <DOWN> at AUTO CAL and select AUTO 3.
4. Push <ENTER> and AUTO3 calibration is started.
5. When Auto calibration is done, 'COMPLETE' message appears on the LCD. After 4 seconds the procedure is returned to RUN mode.

### Manual Mode

Manual mode is used to raise or lower the valve stem manually. In this mode, valve stroke is adjusted only by operating buttons, not by the current input signal. This mode does not affect controlling data registered in the positioner. It only is used to move the valve stem up and down.

1. Press and hold <ENTER> for 6 seconds in RUN mode until AUTO CAL message is displayed.
2. Scroll with <DOWN> button until MANUAL mode is displayed.
3. Push <ENTER> to enter MANUAL mode. Two lines appear on the LCD. The upper line indicates valve stroke by percentage and the lower line indicates absolute value of inner resistance of the positioner. "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 <UP> is pushed, valve stem moves up (in case of linear valve). If <DOWN> is pushed, valve stem moves down. To make the valve stem move fast, push <ENTER> with <UP>, or <DOWN>.

<UP> only	Increase stem value slowly
<UP> + <ENTER>	Increase stem value quickly
<DOWN> only	Decrease stem value slowly
<DOWN> + <ENTER>	Decrease stem value quickly

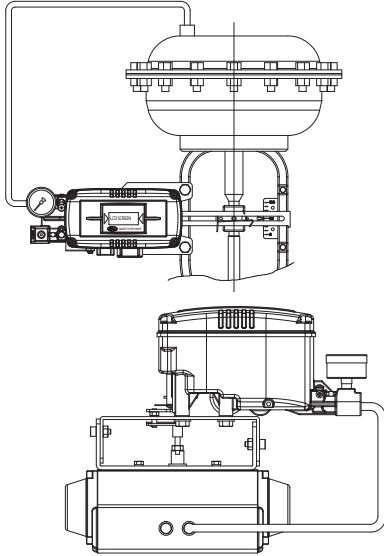
5. Push <ESC> to exit MANUAL mode.

**Piping Connection With Actuator**

Series 185 and Series 285 can operate either single or double acting actuators.

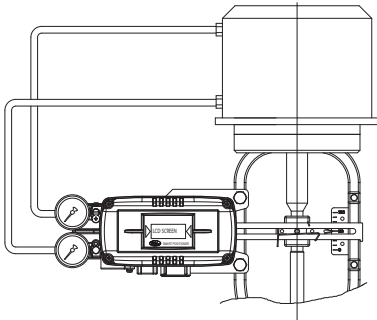
**Single Acting Actuator**

To operate a single acting actuator, connect OUT1 port to actuator supply pressure port. Close off the OUT2 port with the supplied 1/4" NPT plug.

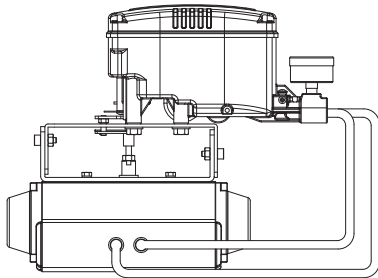


**Double Acting Actuator**

For the Series 185 and 285 double acting types, OUT1 and OUT2 ports are used.



**Piping Connection Example of Series 185 with Double Acting Actuator**

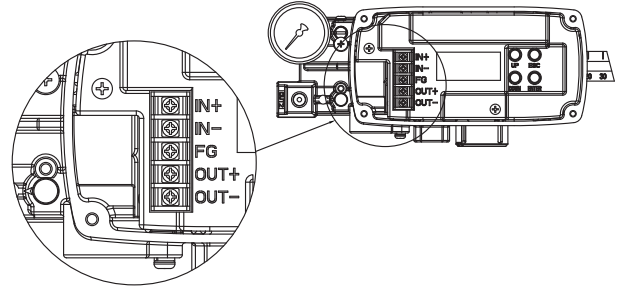


**Piping Connection Example of Series 285 with Double Acting Actuator**

**Power Connection**



1. Before connecting terminal, power must be shut off.
2. Use ring type terminal against oscillation, impact, etc.
3. Series 185 and 285 positioners use 4 to 20 mA DC for power. Minimum supply current is 3.8 mA for all models. Maximum supply current must not exceed 24 mA.
4. In order to protect the Smart Positioner, the ground terminals should be grounded.
5. Use twisted cable with conductor sectional area at least 0.0019 in<sup>2</sup> (1.25 mm<sup>2</sup>), and suitable for 600 V as on conductor table of NEC Article 310. Outer diameter of cable should be .25" to .39" (6.35 to 10 mm). Use shielded wire against electromagnetic waves and noise.
6. Do not install the cable near equipment such as a high-capacity transformer or motor.



**Terminal Plate of Series 185 and 285**

**Terminal Connection of Current Input Signal**

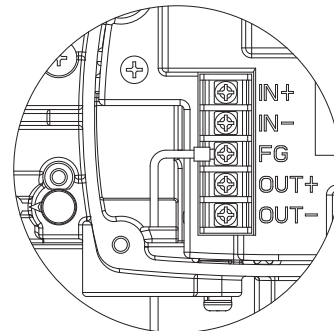
1. Open cover by loosening the four M4 bolts on positioner cover.
2. Loosen locking bolts of terminal plate.
3. Insert a cable through the cable connector in the positioner.
4. Use a ring type cable terminal so that it does not come out.
5. Insert terminal bolts in terminal holes of cable and lock them with (+) terminal and (-) terminals on the terminal plate. Tighten terminal bolts with 1.1 lb-ft (15 kgcm) of torque.
6. Be sure not to change the polarity of the terminals.

**Terminal Connection of Feedback Signal**

1. Open cover by loosening the four screws on positioner cover.
2. Loosen locking bolts of terminal plate.
3. Insert a cable through the cable connector in the positioner.
4. Use a ring type cable terminal so that it does not come out.
5. Insert terminal bolts in terminal holes of cable and lock them with (+) terminal and (-) terminals on the terminal plate. Tighten terminal bolts with 1.1 lb-ft (15 kgcm) of torque.
6. Be sure not to change the polarity of the terminals.

**Inner Terminal Connection to Ground**

1. The ground is necessary for the safety of the positioner and system.
2. The ground terminals are inside the terminal in the center of the terminal plate and outside terminal beside outer cable entry. Use any ground terminal that is available. Resistance must be less than 100 Ω.

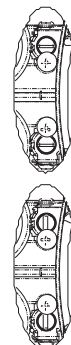


**Ground Terminal Connection**

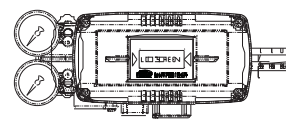
3. For use with inside ground, open cover by loosening the four screws of positioner cover.
4. In order to maintain the ground connection, use a ring type ground cable terminal to prevent it from coming out.

**Variable Orifice**

Hunting can occur if the actuator volume is too small. In this case, adjust the variable orifice using a (-) flathead screwdriver. Hunting is prevented by reducing the flow rate of supply pressure transmitted to the actuator.



**Maximum Open**



**Minimum Open**



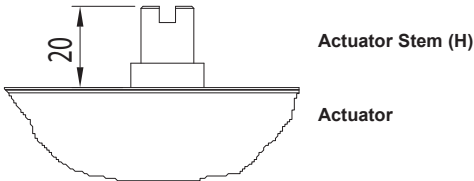
**Installing Series 285 with Bracket**

Series 285 is supplied with a standard bracket. The bracket consists of two parts and is used with a NAMUR shaft. The bracket is assembled in the factory based on .79" (20 mm) of actuator stem height. If the actuator stem height is higher, such as 1.18" (30 mm), or 1.97" (50 mm), reassemble the bracket adjusting to the actuator stem height. Refer to the table below to check hole positions.

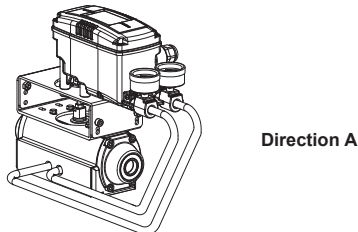
Actuator Stem Height (H)	Markings of Bolt Holes			
	A-L	B-L	A-R	B-R
20 mm	H: 20	H: 20, 30	H: 20	H: 20, 30
30 mm	H: 30	H: 20, 30	H: 30	H: 20, 30
50 mm	H: 50	H: 50	H: 50	H: 50

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

1. Typically, actuator stem heights (H) are .79", 1.18", and 1.97" (20, 30, and 50 mm). After checking H, assemble brackets following previous guidelines. The bracket is set at .79" (20 mm) in the factory.



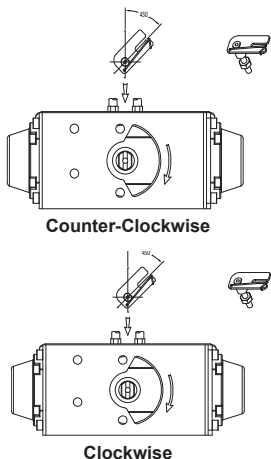
2. Attach bracket to the actuator using hex bolts. The diameter of the bracket bolt holes are .24" (6 mm). Use spring washers or thread lock compound so the bolts will not be loosened by vibration or impact. The direction of the bracket varies by operating conditions, but normal direction is depicted in the following picture. That is, when the piping of actuator and Series 285 is as shown in direction A, the bracket hole and indicator attached on the bottom of the Series 285 main shaft should be mounted in the same direction.



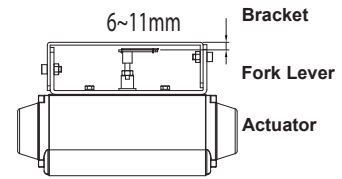
**Attachment Direction of Bracket and Actuator**

3. Set the rotation position of the actuator stem as the initial zero point, which is 0% stroke. For a spring return type actuator, the actuator stem is always rotated to the zero point without supply pressure, making it easy to check the zero point. If the actuator is double-acting, check whether the rotation direction of the actuator is clockwise or counter-clockwise, or the rotation direction of the actuator is using supply pressure.

4. Set the actuator stem as the initial zero point and install a fork lever as showing in the following picture. Confirm the position of initial zero point when actuator stem is turned clockwise and counter-clockwise. Installation angle of fork lever should be about 45 degrees based on the linear shaft. But the angle is not related to NAMUR shaft.

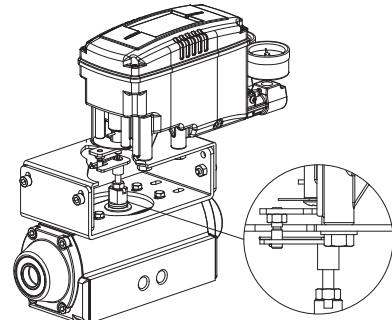


5. Once the fork lever position is set, lock the check nuts on the bottom of the fork lever by turning clockwise. Set the upper height of the fork lever to .24" to .43" (6 to 11 mm) lower than the upper height of the bracket.



6. Attach Series 285 unit to the bracket. Fix the clamping pin on the main shaft center of the Series 285 into the hole of the fork lever. Insert the connection bar attached on the main shaft lever into the fork lever slot to be locked by the fork lever spring. This is to fit the main shaft of the Series 285 to the center of the actuator stem. If they are not fitted correctly, too much force on the main shaft will greatly reduce product durability.

7. Attach Series 285 base and the bracket with hex bolts and plate washers. It is best to lock the bracket and Series 285 together by inserting four bolts after checking the position.



**Fitting the Pin on the Series 285 Main Shaft Into Fork Lever Hole**

**PIPING CONNECTION**

- NOTICE**
1. To prevent ingress of moisture, oil and dust, give careful consideration to the choice of supply pressure compressor and piping.
  2. It is recommended to attach filter or air filter regulator in front of the supply port of the Series 285 unit.

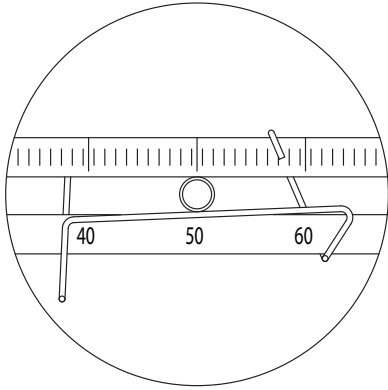
**Conditions of Supply Pressure**

1. Dry air with a dew point that is at least 50°F (10°C) lower than that of the ambient temperature.
2. Free from solid particles. Result of being passed through 5 micron or finer filter.
3. Does not contain oil or lubricating oil.
4. Comply with ANSI/ISA-57.3 1975(R1982) or ISA S7.3-1975(R1981).
5. Not used beyond the range of 20 to 100 psi (140 to 700 kPa).
6. Set supply pressure of air filter regulator to 10% higher than operating pressure of actuator.

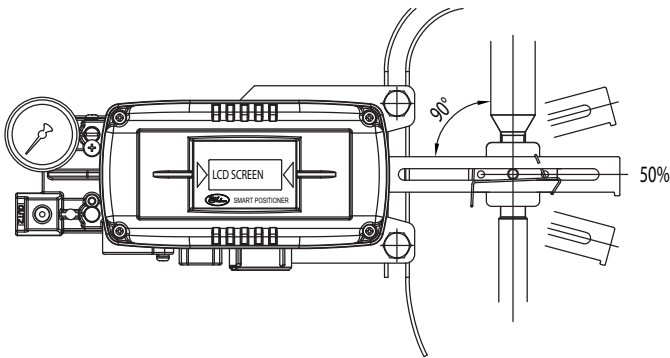
**Conditions of Pipe**

Remove foreign objects from inside of pipe.  
Do not use squeezed or broken pipe.  
To maintain flow rate of Series 285, use a pipe with inner diameter of greater than .24" (6mm) (outer diameter .39" (10 mm)).

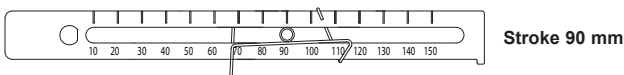
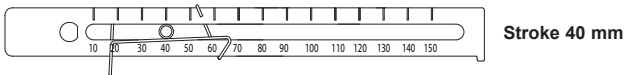
6. Insert the connection bar attached on the actuator clamp into the slot of Series 185's feedback lever. In order to reduce hysteresis, it should appear as shown:



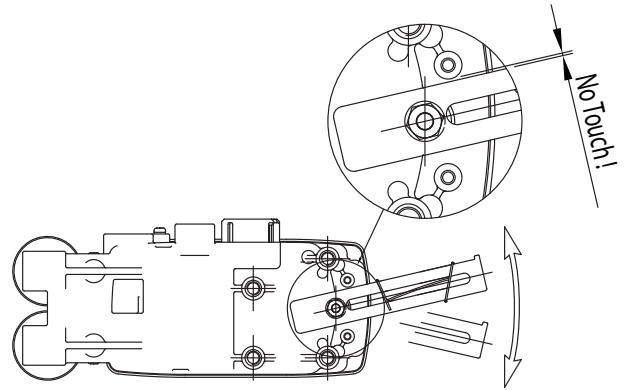
7. Check that the Series 185's feedback lever is level at 50% of valve stroke. If not, move bracket or feedback link until it is level. Product linearity becomes work if Series 185 is installed without being level at 50% of valve stroke.



8. Check valve stroke. The numbers indicating stroke are carved in the Series 185's feedback lever. Set the connection bar attached on the actuator clamp to the number on the feedback lever applicable to valve stroke as shown in the following picture. To set the connection bar and the number, move the bracket attached on Series 185 or connection bar from side to side.



NOTE: After installation, operate the valve from 0 to 100% stroke using an air filter regulator on the actuator. When the stroke is both 0 and 100%, the feedback lever should not reach to the lever stopper on the backside of the Series 185 unit. If the feedback lever reaches the lever stopper, move attachment of Series 185 away from the yoke center.



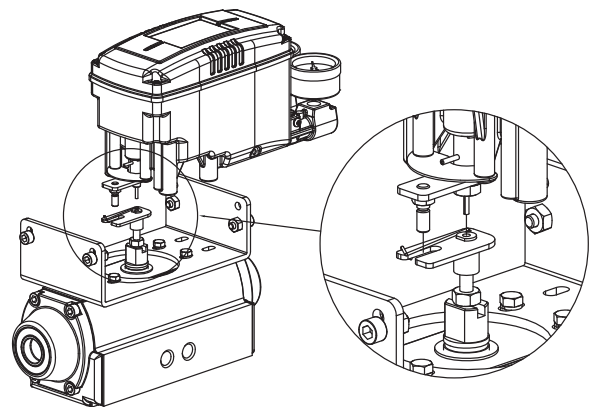
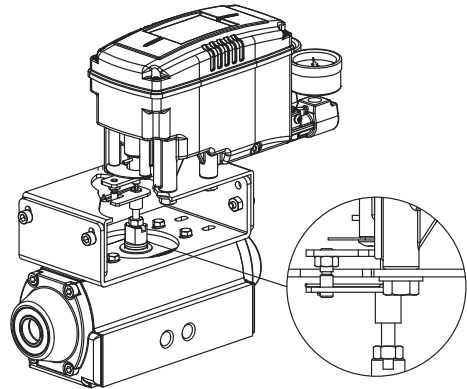
9. Once the Series 185 is installed according to the above procedures, tighten the bolts and nuts of the bracket and feedback lever connection bar completely.

#### Series 285 Installation

Series 285 is designed for rotary motion valves such as Dwyer Instruments' ball and butterfly valves using rack and pinion, scotch yoke or complex type actuators whose stem is rotated 90°.

- Series 285 main body
- Fork lever and lever spring to attach on actuator
- 1 bracket
- Four hex bolts M8x1.25P
- Four M8 plate washers

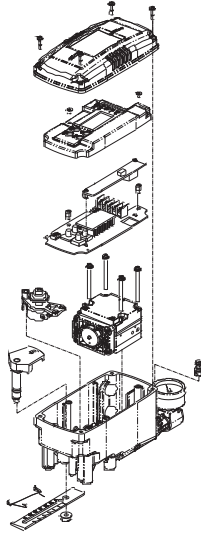
#### Series 285 Installation Example of Fork Lever





### Structure

The structure of the 185 is shown below. The Series 285 structure is the same as the linear model without the feedback lever.



### Installation

Note: When the positioner is replaced or installed with the actuator, make sure of the following:

- All inputs and supply pressure to the valve, actuator and other instruments must be shut down.
- The control valve must be separated from the system with a bypass valve or other equipment so that the entire system does not shut down.
- No pressure remains in the actuator.

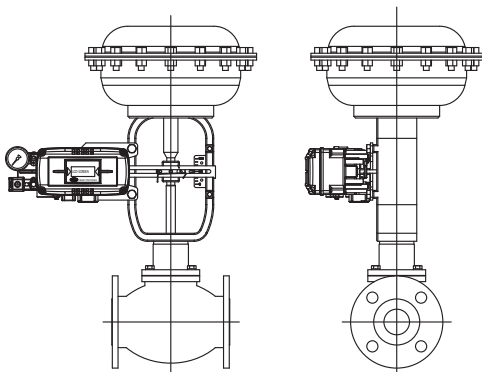
### Tools For Installation

- Hexagonal wrenches
- (+) Screw driver
- (-) Screw driver
- Spanners for hexagon head bolts

### Series 185 Installation

Series 185 is used for linear motion valves such as Dwyer Instruments' globe valves using a spring return type diaphragm actuator or piston actuator. The Series 185 consists of the following components. Be sure that all the components are included.

1. Series 185 main body
2. Feedback lever and lever spring
3. Flange nut (attached on the bottom of main shaft of Series 185 body)
4. Four hexagon head bolts M8x1.25P
5. Four M8 plate washers



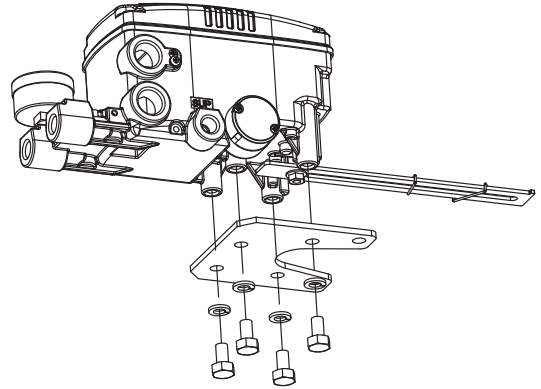
### Installing Series 185 with Bracket

It is necessary to make a proper bracket to attach on the actuator yoke.

The most important considerations in the design of the bracket are as follows:

- Series 185 feedback lever should be at 50% of valve stroke.
- Feedback level connection bar of actuator clamp should be connected in the position so that the valve stroke and the numbers carved on feedback lever are fitted. If the bracket meets the above conditions, Series 185 can be installed very easily.

2. Assemble Series 185 and bracket with bolts. Use standard bolts in bolt holes on the backside of the unit.

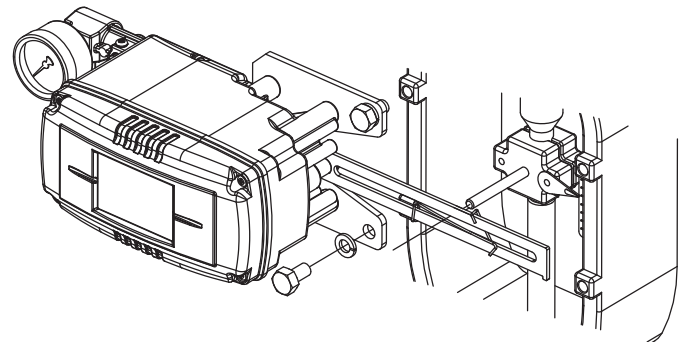


### Installing Series 185 with Bracket

3. After assembling Series 185 and bracket with bolts, attach it using bolt holes of actuator yoke. Do not tighten completely, there must be some space.

4. Install bar connected with Series 185's feedback lever on the actuator clamp. The slot length between Series 185's feedback lever is .26" (6.5 mm), so the diameter of the connection bar should be less than .25" (6.3 mm).

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





## Series 185/285 Smart Positioners

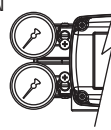
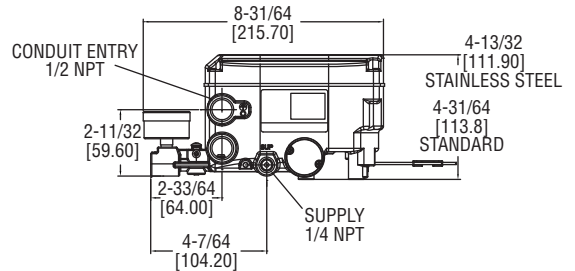
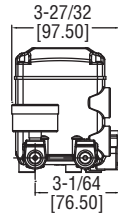
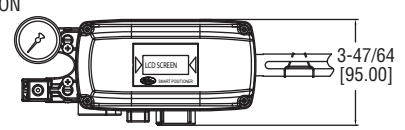
### Specifications - Installation and Operating Instructions



Series 185



Series 285

DOUBLE  
ACTIONSINGLE  
ACTION

The Series 185 and 285 Smart Positioners control valve movements accurately using an input signal of 4 to 20 mA from the controller. In addition, a highly efficient microprocessing operator built into the product performs various functions such as auto calibration, PID control, alarm and Hart® protocol.

#### Features

- LCD allows the user to directly check the positioner condition in the field.
- Endures severe vibration.
- Operates normally regardless of changes in supply pressure during operation.
- Simple to use auto calibration.
- Easily equipped on small actuators because of its small size.
- Low air consumption reduces operating cost.
- Can be used in low voltage (8.5 V), leaving no limitation in controller.
- HART® communication available for configuring parameters or monitoring the valve position.
- Analog feedback signal (4 to 20 mA).
- The adjustment of valve characteristics (linear, quick open, equal percentage) available.
- Tight shut-close and shut-open can be set in the programming menu.
- PID parameters can easily be adjusted in the field without additional communicator.
- Split ranges such as 4 to 12 mA, with 12 to 20 mA available.
- The positioner can manually actuate the valve or damper.
- An air filter regulator can be mounted directly to the positioner.

#### SPECIFICATIONS

- Input Signal:** 4 to 20 mA DC.
- Input Impedance:** 460 Ω max @ 20 mA DC.
- Enclosure:** Aluminum, SS.
- Air Supply:** 35 to 116 psi (2.4 to 9 bar).
- Air Connection:** 1/4" NPT.
- Gage Connection:** 1/8" NPT.
- Conduit Connection:** 1/2" NPT.
- Linearity:** ±0.5% FS.
- Hysteresis:** ±0.5% FS.
- Sensitivity:** ±0.2% FS.
- Repeatability:** ±0.3% FS.
- Air Consumption:** .0004 scfm (.01 LPM) at 20 psig (1.4 bar) supply.
- Flow Capacity:** 2.1 scfm (60 LPM) at 20 psig (1.4 bar) supply.
- Stroke:** 185: 0.5 to 6 in (10 to 150 mm); 285: 0 to 90°.
- Enclosure Rating:** NEMA 4X (IP66).
- Temperature:** Operating: -22 to 185°F (-30 to 85°C).
- Weight:** 185: 3.3 lb (1.5 kg); 285: 6.4lb (2.9 kg).
- Lever:** 185: .39 to 1.57 in (10 to 40 mm); 285: NAMUR.

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