The Series 165EL PRECISOR® II Electro-Pneumatic Positioner is used for linear operation of pneumatic linear valve actuators by means of electrical controller or control systems with an analog output signal of 4 to 20 mA or split ranges.

FEATURES
- There is no resonance in the range of 5 to 200 Hz.
- Perform 1/2 split control without any other substitutes.
- Easy to adjust zero and span.
- Easy feedback connection.
- Fast and accurate response.
- Low air consumption.
- Designed as multi-port type for air tubing.
- Easy to install air tubing connection in any direction.
- Designed as block build structure for maintenance and repair.

STRUCTURE

SPECIFICATIONS
- Input Signal: 4 to 20 mA DC.
- Input Impedance: 250 ±15 Ω.
- Material: Aluminum diecasting.
- Air Supply: 20 to 101 psig (1.4 to 7.0 bar).
- Air Supply Connection: 1/4˝ NPT.
- Gage Connection: 1/8˝ NPT.
- Electrical Connection: Screw Terminal.
- Conduit Connection: 1/2˝ NPT.
- Linearity: ±0.2% of FS.
- Hysteresis: 1% of FS.
- Sensitivity: ±0.2% of FS.
- Repeatability: ±0.5% of FS.
- Air Consumption: 0.10 scfm (3 LPM) at 20 psig (1.4 bar) supply.
- Flow Capacity: 28 scfm (80 LPM) at 20 psig (1.4 bar) supply.
- Stroke: 0.5 to 6˝ (10 to 150 mm).
- Enclosure Rating: IP66.
- Operating Temperature: 165EL: -4 to 158°F (-20 to 70°C); 165EL-SS: -40 to 158°F (-40 to 70°C); 165EL-FM: -4 to 140°F (-20 to 60°C).
- Weight: 165EL: 6.1 lb (2.7 kg); 165EL-SS: 12.6 lb (5.7 kg).
- Agency Approvals: CE (165EL only), FM (165EL only).

PRINCIPLE OF OPERATION
Increase the input current signal to change lift position of valve. Force exerted by (1) Torque Motor reduces Nozzle Back Pressure with increase in gap between (2) Flapper and (3) Nozzle. Then (5) Spool moves upward and the (7) Seat opens simultaneously. Air pressure of OUT1 pipe is discharged to (10) Actuator. As pressure in the actuator chamber goes up, (12) Actuator Stem starts to move. The movement of (12) Actuator Stem exerts force to the (a) Feedback Spring through Feedback Shaft connections. Then (10) Actuator will stop at the point of force balance exerted by the input current signal and the feedback spring.
INSTALLATION

Example of attaching to actuator

Example 1.
Case of directly attaching to diaphragm valve.

Example 2.
Case of using a bracket.

Connection with Feedback Lever
Attach in the position that the valve stem and lever form a right angle when the input signal is 50%. Attach to the position that the runout angle is within the range of 10 to 30°.

INSTALLATION cont.

Direct Action & Reverse Action
Attach the cam in the procedure of loosening the hexagonal nut with flange first, setting the actuator to the starting position and then setting the cam reference line and the bearing contact point of span adjusting arm unit to the same position. Do not apply the supply pressure when attaching the cam as otherwise it is very dangerous. When the positioner is shipped out, the cam is tentatively tightened to the shaft. Be sure to firmly lock the cam to the lock nut [tightening torque 17.7 to 22.1 in-lbs (2.0 to 2.5 NM)].

AIR PIPING CONNECTION
Fully purge the pipe to remove foreign matter. Use a clean supply air fully removed of humidity and dust. Use a Series AFR filter regulator to keep supply air pressure constant.
ELECTRICAL WIRING
Connect the (+) and (-) output terminals from the regulator with the (+) and (-) input terminals, respectively, of the positioner.
- Use Cable Gland in pressure tight packing type. (Cable O.D. = 0.375˝).
- Use 1/2˝ NPT standard for conduit thread connection type. There is a Spare Bolt in the terminal board.

ADJUSTMENT
Check the following prior to starting the adjustment:
- The pipeline is correctly connected with the pressure supply port and OUT1 and OUT2 port.
- The wires are correctly connected with the (+), (-) and grounding terminals.
- The actuator and positioner are sturdily connected.
- For locking of the auto/manual changeover screw of pilot valve (fully tightened in the clockwise direction).
- The span adjusting lever of internal feedback lever is attached to the correct (Direct or Reverse) position. Flange nut is firmly locked.

Zero Adjustment
Set input signal to the Stroke starting signal (4 mA) then turn the Zero Adjuster clockwise or counterclockwise. In case of Spring Actuator, check if it is set to standard pressure in Zero Point. If not, repeat Zero adjustment.

Span Adjustment
Adjust Range Adjustment so that an Actuator stops at 0% position of the Stroke by the 0% applied input signal and 100% position for 100% input signal respectively. Check Zero Point and repeat Zero Span Adjustment. 1/2 Split Range can be used by Zero and Span Adjustment. After Setting, tighten up Lock Screw of Span adjustment.

Auto/Manual Switch
This is a Switch for changing Auto and Manual. Shipped products are set for Auto. To use Manual operation, turn A/M Switch counterclockwise. In manual operation, the pressure of AFR regulator connects to Actuator. After using, return switch to “A”. Not available for OUT2.

MAINTENANCE
If the supply air is fouled, the positioner may not operate normally. Periodically check the compressed air cleaning system and make sure that clean air is always supplied. When disassembling the pilot valve, coat grease to the O-ring of the sliding section. When the fixed orifice is clogged with carbon particles or others, remove the pilot valve Auto/Manual changeover screw (built-in fixed aperture) and clean it by inserting a 32 AWG wire into the aperture. If it must be replaced with new one, stop the supply pressure and remove the stopper screw of the pilot valve. Check the positioner once a year. Treatment at an early stage is especially important if the positioner is used in severe environments, like coastal area. In the unlikely event the 165EL Series Positioner should fail, the unit can be returned to the factory for warranty repair if the warranty period has not expired. Contact our customer service department for a RGA number and to setup the return.

WARNING
Do not apply large vibration or impact to the positioner. The positioner must be handled very carefully during transportation and operation. If the positioner is used at temperatures outside of the specification, the sealing materials deteriorate quickly and also the positioner may not operate normally. Use clean supply air fully removed of humidity and dust. Do not remove the terminal cover at a dangerous position during power conduction. Be sure that the terminal cover and body cover are installed during the operation. If you leave the positioner at the operation site for a long time without using it, put the cover on it so that rain water does not enter the positioner. If the atmosphere is of high temperature or high humidity, take measures to avoid condensation inside. The condensation control measures must be taken thoroughly for export shipment.
## TROUBLESHOOTING

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<th>Cause</th>
<th>What To Do</th>
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<td>Input or increase supply air</td>
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<tr>
<td></td>
<td>Loose connection</td>
<td>Tighten set screw of terminal</td>
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<tr>
<td></td>
<td>Wrong wiring for (+) and (-)</td>
<td>Connect wiring (+) and (-)</td>
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<td></td>
<td>Short or open circuit of terminal motor</td>
<td>Replace Motor Unit</td>
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<td></td>
<td>Clogged nozzle</td>
<td>Replace Motor Unit</td>
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<td></td>
<td>Loose or wrong setting of feedback lever</td>
<td>Correct setting and tighten</td>
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<tr>
<td>OUT1 pressure raised, does not come down</td>
<td>Leakage of A/M switch</td>
<td>Tighten or replace A/M switch</td>
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<tr>
<td></td>
<td>Wrong contact or search of Flapper</td>
<td>Replace Motor Unit</td>
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<tr>
<td></td>
<td>Clogged fixed orifice</td>
<td>Clean or replace fixed orifice</td>
</tr>
<tr>
<td>Output pressure is operated by A/M switch only</td>
<td>Clogged nozzle</td>
<td>Clean nozzle or replace Motor Unit</td>
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<tr>
<td>Hunting occurs</td>
<td>Off-positioned stabilizer spring</td>
<td>Insert stabilizer spring</td>
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<td></td>
<td>Too low of actuator volume</td>
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<td></td>
<td>Clogged fixed orifice</td>
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<td>Actuator is operated by On/Off only</td>
<td>Wrong connection of OUT1 and OUT2 tube</td>
<td>Correct position of tube</td>
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<tr>
<td>Linearity is not good</td>
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<td>Readjust setting of feedback lever</td>
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<tr>
<td></td>
<td>Wrong Zero, Span Adjustment</td>
<td>Readjustment of Zero, Span Adjustment</td>
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<tr>
<td></td>
<td>Supply pressure is unstable</td>
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<td>Hysteresis is not good</td>
<td>Wrong setting of Seat Adjuster</td>
<td>Readjust Seat Adjuster</td>
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<td>Loose connection of actuator and positioner</td>
<td>Tighten connection</td>
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<tr>
<td></td>
<td>Cam Shaft is worn out</td>
<td>Replace Cam Shaft</td>
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