SS3 Linear / Rotary Smart Valve Positioner

Sturdy explosion proof housing and smart performance with innovative and ever-strong coil drive even under harsh working environments

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FEATURES

- Flameproof IECEx / ATEX / KC Ex d IIC T6
- Easy and quick auto-calibration
- Detecting RA (reverse acting) or DA (direct acting) automatically regardless of wrong air connections
- Available to use for single or double acting without any special adjustments
- Compact design allowing to be installed on small actuators
- Providing error messages against performance failures
- Possible to test the actuator with any fixed signal under a test mode
- Programmable characteristic curve with 17 points
- Wide operating temperature range -22°F ~ +167°F
- Improved control of high-friction globe and ball valves by eliminating overshoot and hunting
- Low air consumption
- Providing a mounting bracket to meet IEC 60534-6-1 for linear valves
- Supporting a NAMUR mounting pattern IEC 60534-6-2 (VDI/VDE 3845) and providing a multi-size mounting bracket for rotary valves

OPTIONS

- Output position transmitter (4 - 20 mA)
- 2 x alarm limit or micro switch (SPDT)
- HART communication
- Profibus communication (in progress)
- Fieldbus Foundation communication (in progress)
### SPECIFICATIONS

<table>
<thead>
<tr>
<th>Input Signal</th>
<th>4 - 20 mA @ 24 VDC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Min. / Max. Current</td>
<td>3.6 mA / 50 mA</td>
</tr>
<tr>
<td>Voltage Drop (Resistance)</td>
<td>Without Hart : 8.7 VDC (435Ω @ 20 mA)</td>
</tr>
<tr>
<td></td>
<td>With Hart : 9.4 VDC (470Ω @ 20 mA)</td>
</tr>
<tr>
<td>Stroke / Angle</td>
<td>Linear type : 5 - 130 mm*</td>
</tr>
<tr>
<td></td>
<td>Rotary type : 25 - 120°</td>
</tr>
<tr>
<td>Air Supply Pressure</td>
<td>1.4 - 7 bar (20 - 100 psi), filtered, compressed dry and non-oiled to meet Class 3 of ISO 8573-1</td>
</tr>
<tr>
<td>Output Pressure Range</td>
<td>0 - 100% of supply air pressure</td>
</tr>
<tr>
<td>Air Capacity</td>
<td>80 ℓ/ min = 4.8 Nm³/h = 2.8 scfm (Sup = 20 PSIG)</td>
</tr>
<tr>
<td></td>
<td>233 ℓ/ min = 14 Nm³/h = 8.2 scfm (Sup = 90 PSIG)</td>
</tr>
<tr>
<td>Air Consumption</td>
<td>2.8 ℓ/ min = 0.17 Nm³/h = 0.1 scfm (Sup = 20 ~ 90 PSIG)</td>
</tr>
<tr>
<td>Characteristic</td>
<td>Linearity &lt; ±0.3% F.S</td>
</tr>
<tr>
<td></td>
<td>Sensitivity &lt; 0.2% F.S</td>
</tr>
<tr>
<td></td>
<td>Hysteresis &lt; 0.2% F.S</td>
</tr>
<tr>
<td></td>
<td>Repeatability &lt; 0.2% F.S</td>
</tr>
<tr>
<td>Performance Characteristic</td>
<td>Linear, EQ %, Quick open, User set (17 points)</td>
</tr>
<tr>
<td>LCD Indication</td>
<td>4-digit LCD indicator</td>
</tr>
<tr>
<td>Adjustable Speed</td>
<td>1 - 1000 (lowest 1, highest 1000)</td>
</tr>
<tr>
<td>Scan Time</td>
<td>2ms</td>
</tr>
<tr>
<td>Shut-off Value</td>
<td>Range 0 - 10% of position signal</td>
</tr>
<tr>
<td>Valve Action</td>
<td>Direct action (DA) / Reverse action (RA)</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>-30 ~ +75°C (-22 ~ +167°F)</td>
</tr>
<tr>
<td>Pneumatic Connections</td>
<td>NPT 1/4</td>
</tr>
<tr>
<td>Electrical Connections</td>
<td>NPT 1/2</td>
</tr>
<tr>
<td>Protection Class</td>
<td>Flameproof IECEx / ATEX / KC Ex d IIC T6, IP66</td>
</tr>
<tr>
<td>Body Material</td>
<td>Aluminum die-cast / powder-painted</td>
</tr>
<tr>
<td>Weight</td>
<td>6.16 LBS.</td>
</tr>
</tbody>
</table>

* Up to 200mm on request  ** -40° C on request

### PRINCIPALS OF OPERATION

If 4-20 mA input signal is supplied, the micro processor compares input signal with position feedback and sends control signal to the I/P converting module. Pneumatic signal from the I/P converting module operates the valve and the valve stays at the desired position.
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**MOUNTING TO SS3L (Linear Type)**

- **< Front View >**
- **< Side View >**
- **< Feedback Lever Connection >**

**“A” Type**

**“B” Type**

**“C” Type**

Feedback Lever

- Mounting on yoke with plane surface
- Center bolt for yoke mounted actuators
- ‘U’ bolts for pillar mounted actuators

**MOUNTING TO SS3R (Rotary Type)**

- **NAMUR Type Mounting**
  (VDI/VDE 3845, IEC 60534-6-2)
- **Fork Lever Type Mounting**

**Size Variation of Multi-Size Bracket**

1) 80 x 30 x 20 (H) 130 x 30 x 20 (H)
2) 80 x 30 x 30 (H) 130 x 30 x 30 (H)
3) 80 x 30 x 50 (H) 130 x 30 x 50 (H)

H : Rotary Actuator Shaft Height
L : Length (80 or 150mm)
AIR CONNECTIONS SS3L (Linear Type)

**Direct Acting (DA)**

**DA 1**
As the input signal increases, Valve stem moves downwards  
Actuator : DA

**DA 2**
As the input signal increases, Valve stem moves downwards  
Actuator : DA

**DA 3**
As the input signal increases, Valve stem moves downwards

**Reverse Acting (RA)**

**RA 1**
As the input signal increases, Valve stem moves upwards  
Actuator : RA

**RA 2**
As the input signal increases, Valve stem moves upwards  
Actuator : RA

**RA 3**
As the input signal increases, Valve stem moves upwards

AIR CONNECTIONS SS3R (Rotary Type)

<table>
<thead>
<tr>
<th>Spring Return</th>
<th>Double Acting</th>
<th>Double Acting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actuator : RA</td>
<td>Out1 : piped, Out2 : plugged</td>
<td>Out1 : piped to Actuator port A, Out2 : piped to Actuator port B</td>
</tr>
<tr>
<td>Actuator : RA</td>
<td>Out1 : piped to Actuator port A, Out2 : piped to Actuator port B</td>
<td></td>
</tr>
<tr>
<td>Actuator : DA</td>
<td>Out1 : piped to Actuator port B, Out2 : piped to Actuator port A</td>
<td></td>
</tr>
</tbody>
</table>

As the input signal increases, Actuator shaft rotates counter-clockwise
As the input signal increases, Actuator shaft rotates counter-clockwise
As the input signal increases, Actuator shaft rotates clockwise
**ELECTRICAL CONNECTIONS**

1. **IN. 4-20mA input signal**
2. **Frame Ground**
3. **OUT. 4-20mA output signal**

- **1 (+)**
- **2 (-)**
- **3 (FG)**
- **4 (+)**
- **5 (-)**

- **(+)** 11 (NO)
- **(-)** 12 (NC) 13 (C)
- **(+)** 14 (NO)
- **(-)** 15 (NC) 16 (C)

**CHARACTERISTIC CURVES**

**QUICK START AND CHECKING**

<table>
<thead>
<tr>
<th>Button</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auto-Calibration</td>
<td>Push 5 seconds for auto-calibration</td>
</tr>
<tr>
<td>Span</td>
<td>Push 5 seconds to change a measured span (Try this option only when a valve doesn’t reach a desired position)</td>
</tr>
<tr>
<td>Ambient Temp.</td>
<td>Confirm an ambient temperature surrounding this smart valve positioner</td>
</tr>
</tbody>
</table>
PARAMETERS DIAGRAM

- Shows the operating situation of the positioner
- Changes the parameters
- Decides LCD display mode in mA, % or a reverse way
- Converts to the manual mode
- Shows the selected parameters and a total valve runtime
- Performs auto-calibration and resets all programmed values
- Main parameters
- Tests in process of 2-step, 4-step, or 10...100%
- Locks the set values

**Parameter** | **Description** | **Function** | **Default**
--- | --- | --- | ---
INPU | Input signal | 4 ~ 20mA or 20 ~ 4mA | 4 ~ 20mA
R/DA | Reverse acting or direct acting | Auto-set
L/EQ | Characteristic | Linear, E.Q.% (1:25 or 1:50), Quick open or User set (17 points) | Linear
SPAN | Span adjustment | 0 ~ 100% | 100%
ZERO | Zero adjustment | 0 ~ 99% | 0%
PID | P-GN / I-GN / D-GN | Proportional / Integral / Differential gain value | Auto-set
SPED | Response speed | 1 ~ 1000 | 1000
SWST | Slow start | Smooth operation (ON or OFF) | Auto-set
CNLT | Control limit | 50 ~ 1250 | Auto-set
GCNL | Gap control limit | 50 ~ 1250 | Auto-set
DEAD | Dead band | 0 ~ 9.99% | 0.5%
FDGN | D-gain setting for hard mode | D-Gain setting for hard mode | Auto-set
C/MD | Standard actuator, strong valve packing friction, small actuator | NORM
SHUT | Shut-off | 0 ~ 9.9% | 0.3%
FOPN | Full open | 0 ~ 9.9% | 0.3%
OUT | Output signal | 4 ~ 20mA or 20 ~ 4mA | 4 ~ 20mA
SPLT | Split range | 4 ~ 12mA or 12 ~ 20mA | 4 ~ 20mA
DIGN | Display place | Movement to one or two decimal places | 1
ALAM | Internal match with 4~20mA input signals from a calibrator | Factory setting
ICAL | Internal match with 4~20mA output signals to a calibrator | Factory setting
FCAL | Polling address | HART Communication polling address (0 ~ 15) | 0
Note that 24 VDC should be supplied for power.

ZERO and SPAN of position feedback are automatically set after auto-calibration process.

- With mA loop calibrator
  4 (+)  
  5 (-)  

- With multimeter (mA)
  4 (+)  
  5 (-)  

Micro Switches (SPDT)

<table>
<thead>
<tr>
<th>Type</th>
<th>SPDT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rating</td>
<td>10.1A @ 250 VAC</td>
</tr>
<tr>
<td>Ambient Temperature</td>
<td>-30 ~ 85° C</td>
</tr>
</tbody>
</table>

Position Transmitter

- Output Signal: 4 - 20 mA, 2-wire
- Power Supply: 12 - 30 VDC
- Output Current Limit: 30 mA DC
- Linearity: ±0.5% FS
- Operating Temp.: -30 ~ +80° C
DIMENSIONS SS3L (Linear Type)

DIMENSIONS SS3R (Rotary Type)

< Fork Lever Type >