Accurate, Simple, Rugged

The primary function of a valve positioner is to ensure that the control valve plug position is always proportional to the value of the controller output signal, regardless of packing box friction, diaphragm actuator hysteresis, or out-of-balance forces on the valve plug. The controller output signal may be pneumatic or electric, depending on the type of positioner.

BHGE’s Masoneilan 8012 and 8013 Series cam positioner is a force-balance electro-pneumatic device which, by directly comparing valve position with a controlled DC output signal, provides excellent dynamic response and positioning accuracy. One multi-lobe cam provides field-changeable linear- or percentage-control characteristics without additional parts.
Operation

The 8013 Series electro-pneumatic cam positioner is able:

- To change the valve action (increase in electrical signal opens or closes the valve)
- To change control characteristics (linear or equal-percentage)
- To operate each of two control valves (split-range)

The 8013 Series positioner is available for either direct action (increase in electrical signal increases output pressure) or reverse action (increase in electrical signal decreases output pressure). In addition, the positioner provides an accurate means of split-ranging controller output signal for sequential operation of two control valves by a single controller.

8013 Series cam positioner mounted on Camflex II (similar on Minitork II and 31000 Series)

8013 "Standard"

8013 Series positioner mounted on 87/88 multi-spring actuator

87 & 88

8013 a came course <= 2.5"
**Housing:** The cast aluminum case is mounted at the front of the device by means of a mounting plate and a molded support.

**Beam and flexure bearings:** Beryllium copper flexure bearings provide friction-free fulcrum points for the beam.

**Pilot:** High-capacity type for fast stroking speeds. The metering tube for the nozzle air supply is equipped with a clean-out plunger.

**Cam:** Only one cam can be provided, depending on the selected lobe, equal-percentage or linear (and linear split-range) control characteristics. Linkage and associated backlash problems are essentially eliminated by mounting the cam directly to the end of the plug shaft (rotary valves) or the actuator stem (reciprocating valves).

**Electrical circuit:** The 8013 Series electro-pneumatic positioner can be supplied or easily adapted to accommodate the DC output signals of nearly all the electric controllers presently available. The coil is impregnated with an insulating material.
Operation

Any variation in the output signal of an electro-pneumatic controller causes the coil to produce a force on the beam, moving the flapper to cover or uncover the nozzle.

The modification in nozzle back pressure causes, through the pilot, a variation of output pressure to the control valve actuator. An increase in electrical signal increases output pressure in direct action and decreases output pressure in reverse action.

The resultant plug motion is transmitted through the positioner lever to the force-balance spring, extending or compressing the spring until the force exerted by it on the beam balances the opposing force of the coil.

The system is then in equilibrium, and positioner output is stabilized at the necessary level to maintain the desired valve plug position. When the forces on the beam are in equilibrium, there is theoretically no flow of air into or out from the pilot.

Actually, a small bleed is provided between supply and output to increase pilot responsiveness when at equilibrium.

Hazardous Environment Approvals

ATEX Approvals (2014/34/EU Directive)

**Explosion-proof:**
- II 2 G/D Ex d IIB + H2
- T6 (Tamb. = -20°C to +68°C)
- T5 (Tamb. = -20°C to +80°C)
- IP 65 T100 (Ta +80°C)

**Intrinsic safety:**
- II 1 G/D Ex ia IIC
- T6 (Tamb. = -55°C to +40°C)
- T4 (Tamb. = -55°C to +80°C)
- IP 65 T125 (Ta +80°C)

FM Approvals (Factory Mutual)

**Explosion-proof:**
- Class I, Div 1, Groups B, C and D

**Dust ignition-proof:**
- Class II, Div 1, Groups E, F and G
- Suitable for Class III, Div 1

**Nema 4X**
**General Data**

**Performance Characteristics**

**Air supply:**
1.4 to 5.2 bar (20 to 75 psi) depending on the valve size and actuator action.

**Air consumption and output:**

<table>
<thead>
<tr>
<th>Supply</th>
<th>bar</th>
<th>1.4</th>
<th>2.4</th>
<th>5.2</th>
</tr>
</thead>
<tbody>
<tr>
<td>psi</td>
<td></td>
<td>20</td>
<td>35</td>
<td>75</td>
</tr>
<tr>
<td>Maximum consumption (steady state)</td>
<td>st.m3/h</td>
<td>0.40</td>
<td>0.55</td>
<td>0.85</td>
</tr>
<tr>
<td>Maximum air output (steady state)</td>
<td>Scfm</td>
<td>0.24</td>
<td>0.33</td>
<td>0.51</td>
</tr>
<tr>
<td>Maximum consumption (steady state)</td>
<td>st.m3/h</td>
<td>4.5</td>
<td>8.0</td>
<td>18</td>
</tr>
<tr>
<td>Maximum air output (steady state)</td>
<td>Scfm</td>
<td>2.7</td>
<td>4.8</td>
<td>10.8</td>
</tr>
</tbody>
</table>

**Supply pressure influence:**
0.3 to 0.7 percent of output pressure for 100 mbar supply pressure change (0.2 to 0.5 percent per psi) depending on supply pressure.

**Air connections:**
1/4" NPT

**Ambient temperature operating range:**
- Standard instrument:
  - -20°C to +80°C (-5°F to +175°F)
- Low temperature instrument:
  - -50°C to +60°C (-60°F to +140°F)

Note: refer also to the marking of the apparatus.

**Performance data:**
The performance of a complete valve (i.e. the valve and its packing, actuator, positioner, and accessories) depends upon the specific performance of each component. The performance data given below, in average value in percentage of the input span, concerns Camflex™ II, Minitork™ II, and 87/88 multi-spring actuators equipped with a standard 8013 positioner.

- Hysteresis at mid stroke: 0.8 percent max
- Sensitivity: 0.3 percent max

**Electromagnetic compatibility:**
Compliance with 2004/108/EC Directive

**Weight:**
3.5 kg (7.5 lbs)

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**Electrical Characteristics**

Typical circuit resistance is 216 ohm for an input D.C. signal of 4 to 20 mA.

**The circuit is available for most current signals such as:**

<table>
<thead>
<tr>
<th>Input d.c. signal</th>
<th>Positioner input resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>mA</td>
<td>ohms</td>
</tr>
<tr>
<td>8013 model</td>
<td>8012 model</td>
</tr>
<tr>
<td>1-5</td>
<td>2753</td>
</tr>
<tr>
<td>4-20</td>
<td>216</td>
</tr>
<tr>
<td>10-50</td>
<td>105</td>
</tr>
<tr>
<td>Other signals</td>
<td>On request</td>
</tr>
</tbody>
</table>

Note: for intrinsically safe apparatus, 4-20 mA & 216/273 ohms only.

**Zero adjustment:**
Vernier screw.

**Span adjustment:**
Tension adjustment on force balance spring.

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**Dimensions in mm (inches)**

- Supply 1/4" NPT
- Electrical Connection
- Output 1/4" NPT
- 3.5 kg (7.5 lbs)
Construction and Part Reference

8012-2-C through 8012-7-C model

1. Cover
2. Magnet S/A
3. Adjusting screw
4. Spring (force balance)
5. Spring lever
6. Locking nut
7. Adjusting screw
8. Case
9. Terminal board S/A
10. Nozzle
11. Serial plate
12. Adapter (flame arrestor)
13. Gasket
14. Relay
15. Groove pin
16. Spring (stroke adj.)
17. Sleeve bearing
18. Flame arrestor
19. Cap
20. Diaphragm S/A
21. Bellofram plate S/A
22. Gasket
23. Spring
24. Relay body
25. O-ring
26. Metering tube S/A
27. Mounting screw (relay)
28. Relay plug
29. Spring
30. Holding screw
31. Beam
32. Flapper
33. Weight
34. Coil S/A
35. Spring bracket
36. Magnet S/A
37. Flexure bearing
38. Flexure bearing
39. Biasing spring
Numbering System

US design with FM approvals

Linear positioner for axial actuators: Series Identification 8012

Multi-lobe cam positioner for rotary type valves: Series Identification 8012-b-c

Mounting on
2 Camflex* II, multi-lobe cam
4 Minitork* II & 38002, multi-lobe cam
5 36000 Control Ball Valves, multi-lobe cam
6 HPBV, multi-lobe cam

Multi-lobe cam positioner for rotary type valves

European design with ATEX, CCOE and IA approvals Series Identification 8013-bd

Mounting on
0 37/38 and 87/88 actuators, without cam
1 37/38 and 87/88 actuators, basic cam
2 Camflex* II, multi-lobe cam
3 Sigma F, multi-lobe cam
4 Minitork* II & 38002, multi-lobe cam
5 36000 Control Ball Valves, multi-lobe cam
6 HPBV, multi-lobe cam
7 Varipak*, basic cam
8 Varimax*, multi-lobe cam

Approvals
55 Weather-proof
57 Explosion-proof and Weather-proof (ATEX, CCOE, IA)
58 Intrinsically safe and Weather-proof (ATEX, CCOE, IA)
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