VBB/VBS Series Ball Valve Assemblies

Application

The VBB and VBS Series valves with SmartX Actuators are 2-Way or 3-Way, 1/2" or 3/4", characterized ball valves. The M3 and M2 SmartX Actuators are direct coupled to the VBB/VBS Series valves and accept two-position, floating or proportional control signals from a DDC system, controller, or thermostat for control of hot or chilled water, or solutions of up to 60% glycol. Typical applications include VAV reheat, fan coil units, hot and chilled water coils in air handling units, heat pumps and unit ventilators.

Features

• Easy product selection — all actuators fit all valve bodies.
• Fast, easy actuator installation — no linkage or tools required.
• Flow characterizing insert provides equal percentage flow characteristic for stable, accurate floating and proportional control.
• ANSI IV seat leakage (0.01%) for both 2-Way and 3-Way valves (A and B port).
• Brass and stainless steel trim models.
• Cvs from 0.3…10.
• Normally open, normally closed, and non-spring return assemblies available.
• Two-position, Floating or Proportional (0…5 Vdc, 0…10 Vdc, 5…10 Vdc, or 4…20 mA dc).
• Proportional actuator is direct or reverse acting.
• RoHS Compliant (VBS Assemblies).
• Reach Compliant.

Applicable Literature

• VBB and VBS Series Two-position Spring-Return Ball Valves Installation Instructions, F-27392.
• VBB and VBS Series Floating Spring Return and Non-spring Return Ball Valves Installation Instructions, F-27393.
• VBB and VBS Series Proportional Spring Return and Non-spring Return Ball Valves Installation Instructions, F-27394.
• VBB and VBS Series Brochure, F-27681.
• EN-205 Water System Guidelines, F-26080.
• EN-206 Guidelines for Powering Multiple Actuators, F-26363.
Specifications

Actuator

Voltage  24 Vac for floating and proportional
          100…277 Vac for two position multi-voltage
types

Power Requirements  See Table-1, Table-2, and Table-3.

Control Signal  2-Position, Floating, or Proportional; half wave
rectified power supply

Timing, Full Open to Full Close  See Table-1, Table-2 and Table-3.

Manual Operating Lever / Position Indicator  Standard on all models.

Auxiliary End Switch (optional)  SPST 24 Vac/Vdc, 101 mA…5 A max.

Materials  Thermoplastic base and cover. Approved for use in air plenums.

Shipping & Storage Temperature Limit  -40…169 °F (-40…76°C).

Operating Temperature Limit at max fluid temp.

Floating  32…140 °F (0…60 °C)

Proportional  32…140 °F (0…60 °C)

Two-Position  32…169 °F (0…76 °C)

Humidity  5…95% relative humidity, non-condensing.

Locations  NEMA 2, IEC IP31. Indoor Use Only.

Valve

System Static Pressure Limit  600 psi (4137 kPa).

Fluid Temperature Limit  20…250°F (-7…121°C).

Cv (Kv)  See Tables 4 through 7.

Close-off Pressureb  130 psi 2-Way;  70 psi 3-Way

Differential Pressure  30 psi normal operation
                      20 psi quiet operation.

Seat Material  PTFE

Characterized Insert  Glass-filled PEEK

Seat Leakage  ANSI class IV (0.01%) at both A and B ports with pressure at inlet.

End Connections  NPT threaded (VBxxNxx)

Rangeability  Greater than 300:1.

Body Material  Forged brass.

Stem Material  Stainless steel anti-blow out stem with
dual Viton™ o-rings.

Ball Material  Chrome plated brass (VBB series)
or stainless steel (VBS series).

a. Not rated for steam service.

b. Close-off is defined as the maximum allowable pressure drop to which a valve may be subjected while fully closed.

Agency Listings

M2 SmartX actuators

North America: c-UL-us LISTED per UL 873 and C22.2 No.24.


M3 SmartX actuators:


FCC part15 classB & ICES-003 classB emissions compliant.


EN 61000-6-2 immunity & EN 61000-6-3 emissions compliant.

Australia  This product meets requirements to bear the RCM Mark.

Plenum Rating  Actuators with terminal block or plenum cable leads are plenum rated.

CRN Number  CRN OC0970.9012345678NTY.


Please consult factory for part number specific compliance.

REACh Compliant  Compliant as defined in Article 33 of the REACh Regulation (EC)1907/2006.

Application Schematics

Typical applications

For simplicity, balancing valves and control devices are not shown.

Mixing applications
Ball Valve Assembly Selection Procedure

1. Select the actuator. When selecting a ball valve assembly, you must know the control signal type and voltage to first select an actuator. Consult the following tables: Table-1 covers two-position actuator specifications and model numbers, Table-2 covers floating actuator specifications and model numbers and Table-3 covers proportional actuator specifications and model numbers.

2. Select the valve body. The valve body model number is selected based on the line size (1/2” or 3/4”), ball material trim, and flow coefficient (Cv/Kv) required. Consult Table-4 and Table-5 for brass trim valve body specifications and model numbers and Table-6 and Table-7 for stainless steel trim valve body specifications and model numbers. See “Flow Coefficient Selection” for information in determining the flow coefficient.

Other considerations

1. General service conditions: Make sure the actuator is suitable for the anticipated ambient conditions and that the valve body is compatible with the system fluid temperature and pressure requirements.

2. Close-off pressure: Confirm that the VBB/VBS ball valve’s close off rating is suitable for the valve control application.

3. Space requirements: If mounting space limitations are a consideration, check the actuator/valve assembly dimensions.

4. Pipe reducers: Refer to Tables for estimating effective Cvs when using pipe reducers.

5. Ordering information. You may order the actuator and valve body separately or as a factory assembly. To order a complete valve and actuator assembly, specify the valve body part number and the actuator part number separated by a “+.”

Example: To order actuator valve body VBB2N15 and M312A00 as a factory valve/actuator assembly, specify VBB2N15+M312A00.

Flow Direction

A notch cut into the stem indicator at the tip of the valve stem is an external indicator of where the closed portion of the ball sits internally. Check the notch position prior to assembling the actuator to verify the ball is orientated in the correct plane.
Table-1: Two-Position Actuators

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Control Signal</th>
<th>Spring Return Action (Valve Normal Position)</th>
<th>VA / Voltage</th>
<th>Leads</th>
<th>Stroke Timing</th>
<th>Spring Return Timing</th>
<th>End Switch</th>
</tr>
</thead>
<tbody>
<tr>
<td>M210A00</td>
<td>Two-Position</td>
<td>Normally Open</td>
<td>3.5/1.8 at 24 Vac/24 Vdc</td>
<td>Removeable Terminal Block&lt;sup&gt;b&lt;/sup&gt;</td>
<td>50 sec</td>
<td>35 sec.</td>
<td>SPST</td>
</tr>
<tr>
<td>M210A01</td>
<td></td>
<td></td>
<td>6.0/6.0 at 100…277 Vac, 50/60 Hz</td>
<td>10 ft. (3.05 m) Plenum Cable&lt;sup&gt;c&lt;/sup&gt;</td>
<td>SPST</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M210A11</td>
<td></td>
<td></td>
<td>18 in. (45 cm) Appliance Wire</td>
<td>SPST</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M210A02</td>
<td></td>
<td></td>
<td>3.5/1.8 at 24 Vac/24 Vdc</td>
<td>Removeable Terminal Block&lt;sup&gt;d&lt;/sup&gt;</td>
<td>SPST</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M210A12</td>
<td></td>
<td></td>
<td>6.0/6.0 at 100…277 Vac, 50/60 Hz</td>
<td>10 ft. (3.05 m) Plenum Cable&lt;sup&gt;e&lt;/sup&gt;</td>
<td>SPST</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M210M02</td>
<td></td>
<td></td>
<td>18 in. (45 cm) Appliance Wire</td>
<td>SPST</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M210M12</td>
<td></td>
<td></td>
<td>3.5/1.8 at 24 Vac/24 Vdc</td>
<td>Removeable Terminal Block&lt;sup&gt;d&lt;/sup&gt;</td>
<td>SPST</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M210M12</td>
<td></td>
<td></td>
<td>6.0/6.0 at 100…277 Vac, 50/60 Hz</td>
<td>10 ft. (3.05 m) Plenum Cable&lt;sup&gt;e&lt;/sup&gt;</td>
<td>SPST</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M220A00</td>
<td></td>
<td>Normally Closed</td>
<td>3.5/1.8 at 24 Vac/24 Vdc</td>
<td>Removeable Terminal Block&lt;sup&gt;d&lt;/sup&gt;</td>
<td>SPST</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M220A01</td>
<td></td>
<td></td>
<td>6.0/6.0 at 100…277 Vac, 50/60 Hz</td>
<td>10 ft. (3.05 m) Plenum Cable&lt;sup&gt;e&lt;/sup&gt;</td>
<td>SPST</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M220A11</td>
<td></td>
<td></td>
<td>18 in. (45 cm) Appliance Wire</td>
<td>SPST</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M220A02</td>
<td></td>
<td></td>
<td>3.5/1.8 at 24 Vac/24 Vdc</td>
<td>Removeable Terminal Block&lt;sup&gt;d&lt;/sup&gt;</td>
<td>SPST</td>
<td></td>
<td></td>
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<tr>
<td>M220A12</td>
<td></td>
<td></td>
<td>6.0/6.0 at 100…277 Vac, 50/60 Hz</td>
<td>10 ft. (3.05 m) Plenum Cable&lt;sup&gt;e&lt;/sup&gt;</td>
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<tr>
<td>M220M02</td>
<td></td>
<td></td>
<td>18 in. (45 cm) Appliance Wire</td>
<td>SPST</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M220M12</td>
<td></td>
<td></td>
<td>3.5/1.8 at 24 Vac/24 Vdc</td>
<td>Removeable Terminal Block&lt;sup&gt;d&lt;/sup&gt;</td>
<td>SPST</td>
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</table>

Table-2 Floating Actuators

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Control Signal</th>
<th>Spring Return Action (Valve Normal Position)</th>
<th>VA @ 24 Vac 50/60 Hz</th>
<th>Leads</th>
<th>Stroke Time, sec. 50/60 Hz</th>
<th>Time-out Delay, sec. 50/60 Hz</th>
</tr>
</thead>
<tbody>
<tr>
<td>M332A00</td>
<td>Floating</td>
<td>None</td>
<td>2.3/2.4</td>
<td>Terminal Block&lt;sup&gt;g&lt;/sup&gt;</td>
<td>159/135</td>
<td>181 Sec</td>
</tr>
<tr>
<td>M332A01</td>
<td></td>
<td>Normally Open</td>
<td>3.2/3.3</td>
<td>Terminal Block&lt;sup&gt;g&lt;/sup&gt;</td>
<td>10 ft. (3.05 m) Plenum Cable&lt;sup&gt;c&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>M312A00</td>
<td></td>
<td>Normally Open</td>
<td>3.2/3.3&lt;sup&gt;d&lt;/sup&gt;</td>
<td>Terminal Block&lt;sup&gt;g&lt;/sup&gt;</td>
<td>10 ft. (3.05 m) Plenum Cable&lt;sup&gt;c&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>M322A00</td>
<td></td>
<td>Normally Closed</td>
<td>3.2/3.3&lt;sup&gt;d&lt;/sup&gt;</td>
<td>Terminal Block&lt;sup&gt;g&lt;/sup&gt;</td>
<td>10 ft. (3.05 m) Plenum Cable&lt;sup&gt;c&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>M322A01</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

Table-3 Proportional Actuators

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Control Signal</th>
<th>Spring Return Action (Valve Normal Position)</th>
<th>VA @ 24 Vac 50/60 Hz</th>
<th>Leads</th>
<th>Stroke Time, sec. 50/60 Hz</th>
<th>Time-out Delay, sec. 50/60 Hz</th>
</tr>
</thead>
<tbody>
<tr>
<td>M333A00</td>
<td>Proportional&lt;sup&gt;a&lt;/sup&gt; (Vdc : 0…5, 0…10, 2…10, 5…10, 4…20 mA dc&lt;sup&gt;e&lt;/sup&gt;)</td>
<td>None</td>
<td>2.7/2.8</td>
<td>Terminal Block&lt;sup&gt;e&lt;/sup&gt;</td>
<td>159/135</td>
<td>200/166</td>
</tr>
<tr>
<td>M333A01</td>
<td></td>
<td>Normally Open</td>
<td>2.7/2.8&lt;sup&gt;e&lt;/sup&gt;</td>
<td>Terminal Block&lt;sup&gt;e&lt;/sup&gt;</td>
<td>10 ft. (3.05 m) Plenum Cable&lt;sup&gt;c&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>M313A00</td>
<td></td>
<td>Normally Open</td>
<td>2.7/2.8&lt;sup&gt;e&lt;/sup&gt;</td>
<td>Terminal Block&lt;sup&gt;e&lt;/sup&gt;</td>
<td>10 ft. (3.05 m) Plenum Cable&lt;sup&gt;c&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>M313A01</td>
<td></td>
<td>Normally Closed</td>
<td>2.7/2.8&lt;sup&gt;e&lt;/sup&gt;</td>
<td>Terminal Block&lt;sup&gt;e&lt;/sup&gt;</td>
<td>10 ft. (3.05 m) Plenum Cable&lt;sup&gt;c&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>M323A00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M323A01</td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

Notes:
- a. Default configured for 0…10 Vdc input signal, direct acting control.
- b. All terminal block and appliance wire units accept a 1/2" conduit connector fitting (.875" diameter).
- c. All plenum cable units include an integral 3/8" conduit connector fitting.
- d. Size transformer for 10 VA per actuator.
- e. For 4…20 mA control, a separate isolated transformer must be used with each valve.
- g. Nominal.