Type BM9 Slam-Shut Valve

Features
- Single-piece, integral flanged and ergonomic design of anti rolling feature in the body
- Fully balanced plug design for lower actuation forces
- Can monitor overpressure and/or underpressure in a single stream or in other points of a gas station
- Push-button manual emergency release
- Manual reset through rotation of the reset shaft only
- No external by-pass
- Ease of maintenance through modular design
- Radial seal design resulting in low fluid velocity around the seating surfaces to reduce flow wearing

Introduction
Type BM9 slam-shut valve is an axial flow type, automatic shut-off device suitable for installation as safety device in regulating, distribution and transmission stations of suitably filtered natural gas.

Type BM9 is designed to be used with fuel gases of 1st and 2nd family according to EN 437, and with other non aggressive and non fuel gases. For any other gases, other than natural gas, please contact your local sales office.

The slam-shut valve has the task to quickly shut off the gas flow when the pressure in control point(s) reaches a fixed set value.
Specifications

The Specifications section gives some general specifications for the Type BM9 slam-shut valve. The nameplates give detailed information for a particular slam-shut valve as built in the factory.

### Body Sizes and End Connection Styles
DN 300 / NPS 12: CL300 RF and CL600 RF

### Maximum Allowable Pressure (PS)\(^{(1)}\)
- **CL300 RF**: 51.7 barg / 750 psig
- **CL600 RF**: 103 barg / 1500 psig

### Inlet Pressure Ranges (\(p_{in}\))\(^{(1)}\)
- **CL300 RF**: 0 to 51.7 barg / 0 to 750 psig
- **CL600 RF**: 0 to 100 barg / 0 to 1450 psig \(^{(2)}\)

### Overpressure Set Ranges (\(W_{o\text{h}}\))\(^{(1)}\)
- **CL300 RF**: 0.03 to 50 barg / 0 to 725 psig
- **CL600 RF**: 0.03 to 90 barg / 0 to 1305 psig

### Underpressure Set Ranges (\(W_{d\text{u}}\))\(^{(1)}\)
- **CL300 RF**: 0.01 to 50 barg / 0 to 725 psig
- **CL600 RF**: 0.01 to 80 barg / 0 to 1160 psig

### Minimum/Maximum Allowable Temperature (TS)\(^{(1)(2)}\)
- **Class 1**: -10 to 60°C / 14 to 140°F
- **Class 2**: -20 to 60°C / -4 to 140°F

### Working Temperature Capabilities\(^{(1)}\)
- **Standard Version, Nitrile (NBR) or Fluorocarbon (FKM)**: -10 to 60°C / 14 to 140°F
- **Low Temperature Version, Nitrile (NBR)**: -20 to 60°C / -4 to 140°F

### Slam Shut Controller
**OS9/80X Series** (a sub-family of OS/80X Series)

- **Flow Coefficient**
  - \(C_1\): 83,087
  - \(C_2\): 31

- **Accuracy Class (AG)**
  - Up to ± 1%

- **Response Time (\(t_a\))**
  - ≤ 1 second

### Construction Materials
- **Body**: LCC Steel
- **Sleeve**: Steel
- **O-ring**: Nitrile (NBR) (standard) or Fluorocarbon (FKM) (optional)
- **Disk**: Polytetrafluoroethylene (PTFE)
- **Controller**: See Table 4

### Approximate Weights
- **CL300 RF**: 790 kg / 1742 lbs
- **CL600 RF**: 870 kg / 1918 lbs

### Optional Accessories
- Proximity Switch for remote monitoring
- Solenoid Valve for remote-controlled closure
- Three-way Valve for setting control

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1. The pressure/temperature limits in this Bulletin or any applicable standard limitation should not be exceeded.
2. Published values are in accordance with EN14382 specification.

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**Table 1. Overpressure Shut-off Spring Ranges and Information**

<table>
<thead>
<tr>
<th>CONTROLLER TYPE</th>
<th>SPRING RANGE</th>
<th>SPRING DIAMETER</th>
<th>SPRING LENGTH</th>
<th>PART NUMBER</th>
<th>MATERIAL</th>
<th>SPRING COLOR</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>OS9/80X-BP-R</strong></td>
<td>0.030 to 0.070</td>
<td>0.43 to 1.01</td>
<td>2.00</td>
<td>0.08</td>
<td>75.0</td>
<td>2.95</td>
</tr>
<tr>
<td><strong>OS9/80X-MPA-D-R</strong></td>
<td>0.070 to 0.150</td>
<td>1.01 to 2.17</td>
<td>2.50</td>
<td>0.10</td>
<td>75.0</td>
<td>2.95</td>
</tr>
<tr>
<td><strong>OS9/80X-APA-D-R</strong></td>
<td>0.150 to 0.300</td>
<td>2.17 to 4.35</td>
<td>3.00</td>
<td>0.12</td>
<td>75.0</td>
<td>2.95</td>
</tr>
<tr>
<td><strong>OS9/80X-R</strong></td>
<td>0.300 to 0.700</td>
<td>4.35 to 10.15</td>
<td>4.00</td>
<td>0.16</td>
<td>75.0</td>
<td>2.95</td>
</tr>
<tr>
<td><strong>OS9/80X-R-PN</strong></td>
<td>0.700 to 2.000</td>
<td>10.15 to 29</td>
<td>5.00</td>
<td>0.20</td>
<td>75.0</td>
<td>2.95</td>
</tr>
<tr>
<td><strong>OS9/84X-R</strong></td>
<td>0.50 to 0.70</td>
<td>7.25 to 10.15</td>
<td>0.15</td>
<td>2.17</td>
<td>75.0</td>
<td>2.95</td>
</tr>
<tr>
<td><strong>OS9/84X-R-PN</strong></td>
<td>0.50 to 1.50</td>
<td>7.25 to 21.75</td>
<td>0.20</td>
<td>5.00</td>
<td>75.0</td>
<td>2.95</td>
</tr>
<tr>
<td><strong>OS9/88X-R</strong></td>
<td>5.0 to 25</td>
<td>72.51 to 363</td>
<td>4.00</td>
<td>0.16</td>
<td>75.0</td>
<td>2.95</td>
</tr>
<tr>
<td><strong>OS9/88X-R-PN</strong></td>
<td>18 to 50</td>
<td>261 to 725</td>
<td>5.00</td>
<td>0.20</td>
<td>75.0</td>
<td>2.95</td>
</tr>
<tr>
<td><strong>OS9/80X-R</strong></td>
<td>24 to 41</td>
<td>348 to 595</td>
<td>6.00</td>
<td>0.25</td>
<td>75.0</td>
<td>2.95</td>
</tr>
<tr>
<td><strong>OS9/80X-R-PN</strong></td>
<td>40 to 80</td>
<td>580 to 1160</td>
<td>8.00</td>
<td>0.32</td>
<td>75.0</td>
<td>2.95</td>
</tr>
<tr>
<td><strong>OS9/84X-R</strong></td>
<td>75 to 90</td>
<td>1088 to 1305</td>
<td>10.00</td>
<td>0.40</td>
<td>75.0</td>
<td>2.95</td>
</tr>
<tr>
<td><strong>OS9/88X-R</strong></td>
<td>75 to 90</td>
<td>1088 to 1305</td>
<td>12.00</td>
<td>0.48</td>
<td>75.0</td>
<td>2.95</td>
</tr>
<tr>
<td><strong>OS9/80X-R-PN</strong></td>
<td>150 to 200</td>
<td>725.1 to 290</td>
<td>15.00</td>
<td>0.60</td>
<td>75.0</td>
<td>2.95</td>
</tr>
<tr>
<td><strong>OS9/84X-R-PN</strong></td>
<td>210 to 420</td>
<td>218 to 609</td>
<td>18.00</td>
<td>0.75</td>
<td>75.0</td>
<td>2.95</td>
</tr>
<tr>
<td><strong>OS9/88X-R-PN</strong></td>
<td>30 to 80</td>
<td>435 to 1160</td>
<td>24.00</td>
<td>1.00</td>
<td>75.0</td>
<td>2.95</td>
</tr>
</tbody>
</table>
Table 2. Underpressure Shut-off Spring Ranges and Information

<table>
<thead>
<tr>
<th>CONTROLLER TYPE</th>
<th>SPRING RANGE</th>
<th>RESET DIFFERENTIAL, ∆P</th>
<th>SPRING DIAMETER</th>
<th>SPRING LENGTH</th>
<th>PART NUMBER</th>
<th>MATERIAL</th>
<th>SPRING COLOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>OS9/80X-BP-R</td>
<td>0.010 to 0.030</td>
<td>0.145 to 0.435</td>
<td>0.01</td>
<td>0.14</td>
<td>1.25</td>
<td>0.05</td>
<td>60.0</td>
</tr>
<tr>
<td>OS9/80X-BPA-D-R</td>
<td>0.030 to 0.070</td>
<td>0.435 to 1.015</td>
<td>0.02</td>
<td>0.29</td>
<td>1.50</td>
<td>0.06</td>
<td>60.0</td>
</tr>
<tr>
<td>OS9/80X-MPA-D-R</td>
<td>0.070 to 0.140</td>
<td>0.105 to 2.03</td>
<td>0.03</td>
<td>0.43</td>
<td>1.75</td>
<td>0.07</td>
<td>60.0</td>
</tr>
<tr>
<td>OS9/80X-APA-D-R</td>
<td>0.130 to 0.400</td>
<td>1.88 to 5.8</td>
<td>0.06</td>
<td>0.87</td>
<td>2.25</td>
<td>0.09</td>
<td>60.0</td>
</tr>
<tr>
<td>OS9/80X-APA-D-R</td>
<td>0.400 to 0.600</td>
<td>5.8 to 8.7</td>
<td>0.20</td>
<td>2.90</td>
<td>3.00</td>
<td>0.12</td>
<td>60.0</td>
</tr>
<tr>
<td>OS9/80X-MPA-D-R</td>
<td>0.25 to 0.40</td>
<td>3.62 to 5.80</td>
<td>0.15</td>
<td>2.17</td>
<td>1.75</td>
<td>0.07</td>
<td>60.0</td>
</tr>
<tr>
<td>OS9/80X-MPA-D-R</td>
<td>0.90 to 4</td>
<td>13.05 to 58.01</td>
<td>0.70</td>
<td>10.15</td>
<td>3.00</td>
<td>0.12</td>
<td>60.0</td>
</tr>
<tr>
<td>OS9/80X-BP-R</td>
<td>0.3 to 0.8</td>
<td>4.35 to 11.6</td>
<td>0.25</td>
<td>3.62</td>
<td>1.75</td>
<td>0.07</td>
<td>60.0</td>
</tr>
<tr>
<td>OS9/80X-Apb-D-R</td>
<td>0.8 to 2.0</td>
<td>11.6 to 29</td>
<td>0.50</td>
<td>7.25</td>
<td>2.25</td>
<td>0.09</td>
<td>60.0</td>
</tr>
<tr>
<td>OS9/80X-Apb-D-R</td>
<td>1.0 to 7.0</td>
<td>29 to 102</td>
<td>1.50</td>
<td>21.7</td>
<td>3.00</td>
<td>0.12</td>
<td>60.0</td>
</tr>
<tr>
<td>OS9/80X-Apb-D-R</td>
<td>2.0 to 16.0</td>
<td>102 to 232</td>
<td>6.0</td>
<td>87.00</td>
<td>3.00</td>
<td>0.12</td>
<td>60.0</td>
</tr>
<tr>
<td>OS9/80X-Apb-D-R</td>
<td>8.0 to 30.0</td>
<td>116 to 435</td>
<td>8.0</td>
<td>116</td>
<td>1.75</td>
<td>0.07</td>
<td>60.0</td>
</tr>
<tr>
<td>OS9/80X-Apb-D-R</td>
<td>20 to 70.0</td>
<td>290 to 1015</td>
<td>15</td>
<td>218</td>
<td>2.25</td>
<td>0.09</td>
<td>60.0</td>
</tr>
<tr>
<td>OS9/80X-Apb-D-R</td>
<td>10.0 to 1.5</td>
<td>7.25 to 21.75</td>
<td>0.3</td>
<td>4.35</td>
<td>2.80</td>
<td>0.11</td>
<td>55.0</td>
</tr>
<tr>
<td>OS9/80X-Apb-D-R</td>
<td>1.0 to 3</td>
<td>14.5 to 43.5</td>
<td>0.4</td>
<td>5.80</td>
<td>3.20</td>
<td>0.13</td>
<td>55.0</td>
</tr>
<tr>
<td>OS9/80X-Apb-D-R</td>
<td>2.0 to 8</td>
<td>29 to 116</td>
<td>0.8</td>
<td>8.70</td>
<td>4.00</td>
<td>0.16</td>
<td>55.0</td>
</tr>
<tr>
<td>OS9/80X-Apb-D-R</td>
<td>5.0 to 20.0</td>
<td>72.5 to 290</td>
<td>0.6</td>
<td>8.70</td>
<td>5.50</td>
<td>0.22</td>
<td>51.0</td>
</tr>
<tr>
<td>OS9/80X-Apb-D-R</td>
<td>15.0 to 42.0</td>
<td>218 to 609</td>
<td>0.8</td>
<td>11.60</td>
<td>6.50</td>
<td>0.26</td>
<td>50.0</td>
</tr>
<tr>
<td>OS9/80X-Apb-D-R</td>
<td>30.0 to 60.0</td>
<td>435 to 1160</td>
<td>1</td>
<td>14.50</td>
<td>8.50</td>
<td>0.33</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Table 3. OS9/80X Series Spring-Loaded Pneumatic Slam-Shut Controller Pressure Rating

<table>
<thead>
<tr>
<th>TYPE</th>
<th>MAXIMUM ALLOWABLE PRESSURE</th>
<th>OVERPRESSURE SET RANGE, W&lt;sub&gt;up&lt;/sub&gt;</th>
<th>UNDERPRESSURE SET RANGE, W&lt;sub&gt;dp&lt;/sub&gt;</th>
<th>BODY MATERIAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>OS9/80X-BP-R</td>
<td>5</td>
<td>72.5</td>
<td>0.03</td>
<td>0.44</td>
</tr>
<tr>
<td>OS9/80X-BPA-D-R</td>
<td>20</td>
<td>290</td>
<td>0.5</td>
<td>7.25</td>
</tr>
<tr>
<td>OS9/80X-MPA-D-R</td>
<td>100</td>
<td>1450</td>
<td>0.5</td>
<td>7.25</td>
</tr>
<tr>
<td>OS9/80X-APA-D-R</td>
<td></td>
<td></td>
<td>0.3</td>
<td>4.35</td>
</tr>
<tr>
<td>OS9/80X-R</td>
<td></td>
<td></td>
<td>0.3</td>
<td>4.35</td>
</tr>
</tbody>
</table>

N.B.: 1/4 NPT female threaded connections

Table 4. Controller/Pilot Construction Materials

<table>
<thead>
<tr>
<th>CONTROLLER/PILOT TYPE</th>
<th>MATERIAL</th>
<th>Diaphragm</th>
<th>O-ring</th>
</tr>
</thead>
<tbody>
<tr>
<td>OS9/80X-BP-R</td>
<td>Aluminum</td>
<td>Fabric-finished Nitrile (NBR) or Fluorocarbon (FKM)</td>
<td>Nitrile (NBR) or Fluorocarbon (FKM)</td>
</tr>
<tr>
<td>OS9/80X-BPA-D-R</td>
<td>Steel</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OS9/80X-MPA-D-R</td>
<td>Steel</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OS9/80X-APA-D-R</td>
<td>Steel</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OS9/84X-R</td>
<td>Brass</td>
<td>Lip Seal: PTFE</td>
<td></td>
</tr>
<tr>
<td>OS9/88X-R</td>
<td>Brass</td>
<td>Fabric-finished Nitrile (NBR) or Fluorocarbon (FKM)</td>
<td></td>
</tr>
</tbody>
</table>
Type BM9

Product Description

Main Valve
Type BM9 slam-shut valve uses the pipeline gas pressure for its operation and therefore, it does not require any external energy to operate.

It has a sleeve-type valve, therefore does not need any external by-pass to facilitate the opening of the valve.

The valve can only be opened manually by turning the eccentric shaft counterclockwise if the upstream and downstream pressures are equal.

Controller
Type OS9/80X Series is a sub-family of OS/80X Series. It is a modified version of OS/80X Series to suit Type BM9 slam shut valve. All components/parts between OS and OS9 Series are identical except for:

- The shaft and holder of OS9/80X Series are reinforced.
- The overpressure set range of OS9/80X Series are higher, up to 90 bar / 1305 psig.

Type BM9 slam shut valve is operated by either OS9/80X-R or OS9/80X-R-PN Series controller.

OS9/80X Series controller is available in different types according to set ranges required. See Tables 1 and 2 for details.

The OS9/80X-R-PN Series controller is supplied in two types:

1. Type OS9/80X-R-PN: Pressure range is 0.5 to 40 bar / 7.25 to 580 psig. This controller is made up of Type OS9/80X APA D-R controller which is set at about 0.4 bar / 5.80 psig and Type PRX/182-PN pilot for overpressure and Type PRX/181-PN for underpressure.

2. Type OS9/84X-R-PN: Pressure range is 30 to 80 bar / 435 to 1160 psig. This controller is made of Type OS9/84X-R set at about 20 bar / 290 psig and Type PRX/182-PN pilot for overpressure and Type PRX/181-PN for underpressure.

Types PRX/182-PN and PRX/181-PN pilots are available in different set pressure ranges to suit the application needs.

The -PN Series controllers are used when the required reset differential pressures (\(\Delta P_{wo}\) and \(\Delta P_{wu}\)) are much lower than the standard controller’s reset differential pressures.

The -PN series controllers also have better accuracy than the standard controller.

Range Setting

The reset differential indicates the minimum value to be considered with respect to the line set point for proper resetting of the controller.

Example: Downstream pipeline pressure set point is 15 bar / 218 psig.

Choose OS9/84X-R with blue spring for overpressure and red spring for underpressure, see Tables 1 and 2. The reset differential \(\Delta P_{wo}\) is 3.0 bar / 43.5 psig and \(\Delta P_{wu}\) is 6.0 bar / 87.0 psig.

So the overpressure set value should be 18 bar / 261 psig (15 bar + 3 bar = 18 bar or 218 psig + 43.5 psig = 261 psig) or higher, and underpressure set value should be 9.0 bar / 131 psig (15 bar - 6 bar = 9 bar or 218 psig - 87 psig = 131 psig) or lower.

Accessories

Proximity Switch
In order to send the shut-off opening/closing signal, a proximity switch suitable for installation in hazardous area is used.

The use of this switch foresees the application of an intrinsic safety separation barrier which should be installed in safe area.

The distance between the proximity switch and the barrier should be calculated according to the type of gas and installation electrical specifications.

The proximity switch should be positioned at about 0.5 mm / 0.02 in. from the stem (S).

The adjustment is made by means of adjusting nuts.

On request, the controller can be equipped with two proximity switches to sense open and close positions of the slam shut valve.
Figure 3. OS/80X Series Slam-Shut Controller

Figure 4. Type BM9 Slam-Shut Valve Flow Orientation

Figure 5. Proximity Switch
Figure 6. Proximity Switch Installation

Figure 7. Solenoid Valve Installation

Figure 8. IT/3V Three-way Valve Installation
Solenoid Valve for Remote Controlled Closure

The Types OS/80X-R and the OS/80X-R-PN equipped with a shut-off device for minimum pressure, can be equipped with a three-way valve with explosion-proof construction to permit remote-controlled closure. See Figure 7.

**IT/3V Three-Way Valve for Setting Control** *(Pu max 50 bar / 725 psig)*

It allows the Type OS/80X-R operation and setting control, without having to change the regulator setting. The valve is installed on the Type OS/80X-R control line and it must be connected to a suitable pressure source that is capable of reaching the settings of the Type OS/80X-R.

The IT/3V three-way valve is of the spring-return type and it is equipped with a safety lock plate (B) on the control knob (Q).

When the plate (B) is pivoted, pressure on the knob (Q) makes it possible to put the sensitive member into communication with a pressure source, thus making it possible to perform operation and setting tests. See Figure 8.

Upon completion of the procedures, releasing the knob will reset normal running conditions. The safety lock plate on the knob prevents accidental maneuvers.

**Principle of Operation**

Type BM9 slam-shut valves are used to prevent overpressure, underpressure or both overpressure and underpressure in the system. This slam-shut valve is a combination of an axial flow valve and an OS/80X Series slam-shut controller which keeps the valve open.

Type BM9 has a shutter valve which slides axially. With this design, by-pass is not needed for it to open even with the presence of pressurized gas.

The valve can only be opened manually by turning the eccentric shaft counterclockwise if the upstream and downstream pressures are equal.

When the control pressure is within the set value of the slam-shut controller, the controller prevents the rotation of the eccentric shaft and the valve remains open.

When the control pressure is above or below the set value, the slam-shut controller releases the eccentric shaft closing the slam-shut valve.

The slam-shut controller is provided with a manual release push-button to quickly close the slam-shut valve in case of emergency or during maintenance/checking operations.

Type BM9 can be used with pilot. Supply to pilot comes from the downstream of the slam-shut valve. For this purpose, Type BM9 valve features a threaded hole to be used for supply to pilots. The hole is normally kept closed by a plug.
Type BM9

SLAM-SHUT VALVE WITH TYPE OS9/80X-R CONTROLLER – INSTALLATION IN WIDE-OPEN MONITOR LINE

SLAM-SHUT VALVE WITH TYPE OS9/80X-R-PN CONTROLLER – OVERPRESSURE AND UNDERPRESSURE CONTROL IN WIDE-OPEN MONITOR SYSTEM

Figure 10. Type BM9 Installation Schematics
Installation

Install Type BM9 in a horizontal position and ensure the flow through the body is in the direction indicated by the arrow on the body. See Figure 4.

Ensure that the data found on the slam-shut valve label are compatible with usage requirements.

Make sure that slam-shut controller is installed up right.

Make the connection of the pressure control pipe, taking it off a straight section of the downstream pipe, if possible, far from narrow sections, curves or branches, to avoid variations in the release values of slam-shut device caused by turbulence.

Clean the gas by installing filters or scrubbers upstream of the Type BM9 to avoid abrasion and/or erosion on pressure containing parts.

Ensure that gas is dry. If the gas is not dry, install gas-liquid separator upstream of the Type BM9 and install a heating device on Type BM9.

Capacity Information

To find approximate flow capacity and valve diameter, perform the following procedures:

Calculation Procedures

The following formulas refer to normal operating conditions in a sub-critical state with: \( p_2 > \frac{p_1}{2} \).

Symbols

- \( Q \): Natural gas flow rate in (Stm³/h)
- \( P_1 \): Absolute inlet pressure in bar
- \( P_2 \): Absolute outlet pressure in bar
- \( C_g \): Flow coefficient
- \( C_1 \): Body shape factor
- \( d \): Relative density of the gas

Flow Rate \( Q \)

\[
Q = 0.525 \times C_g P_1 \sin \left( \frac{3417}{C_1} \sqrt{\frac{\Delta P}{P_1}} \right) \text{ DEG}
\]

\[
Q = 0.525 \times C_g P_1
\]

For other gases with different densities, the flow rate calculated with the above formulas must be multiplied with the correction factor:

\[
F = \sqrt{\frac{0.6}{d}}
\]

Power Loss \( \Delta P \)

\[
\Delta P = \left( \frac{P_1}{\sqrt{P_2}} - 4 \left( \frac{Q}{C_g \times 1.05} \right)^2 \right) \frac{2}{P_1}
\]

DN Sizes

Calculate the required \( C_g \) with the following formula:

The above formulas apply to natural gas flow rate only. If the flow rate value \( Q \) refers to other gases, divide it by the correction factor \( F \). See Table 5.

\[
C_g = \frac{Q}{0.525 \times P_1 \sin \left( \frac{3417}{C_1} \sqrt{\frac{\Delta P}{P_1}} \right) \text{ DEG}}
\]

Choose the slam-shut valve with the \( C_g \) higher than the calculated value. After having determined the slam-shut valve diameter, it is suggested to check that the velocity on the seal seat is not higher than 80 m/s by using the following formula:

\[
V = 345.92 \times \frac{Q}{DN^2} \times \frac{1 - 0.002 \times P_u}{1 + P_u}
\]

\( V \) = velocity (m/s)
345.92 = Numerical
\( Q \) = Natural gas flow rate in (Stm³/h)
\( DN \) = Valve nominal diameter (mm)
\( P_u \) = Inlet pressure in relative value (bar)

In case of velocities higher than indicated limits, increase the valve diameter.

Table 5. Gas Conversion

<table>
<thead>
<tr>
<th>GAS</th>
<th>RELATIVE DENSITY(( d ))</th>
<th>FACTOR (F)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air</td>
<td>1</td>
<td>0.78</td>
</tr>
<tr>
<td>Butane</td>
<td>2.01</td>
<td>0.55</td>
</tr>
<tr>
<td>Propane</td>
<td>1.53</td>
<td>0.63</td>
</tr>
<tr>
<td>Nitrogen</td>
<td>0.97</td>
<td>0.79</td>
</tr>
</tbody>
</table>
Type BM9

Dimensions andWeights

Figure 11. Type BM9 Dimensions

Table 6. Type BM9 Dimensions and Weights

<table>
<thead>
<tr>
<th>END CONNECTION STYLE</th>
<th>A (mm)</th>
<th>A (in.)</th>
<th>B (mm)</th>
<th>B (in.)</th>
<th>C (mm)</th>
<th>C (in.)</th>
<th>D (mm)</th>
<th>D (in.)</th>
<th>E (mm)</th>
<th>E (in.)</th>
<th>WEIGHT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>kg</td>
</tr>
<tr>
<td>CL300 RF</td>
<td>775</td>
<td>31</td>
<td>272</td>
<td>11</td>
<td>1013</td>
<td>40</td>
<td>705</td>
<td>28</td>
<td>675</td>
<td>27</td>
<td>790</td>
</tr>
<tr>
<td>CL600 RF</td>
<td>819</td>
<td>32</td>
<td>294</td>
<td>12</td>
<td>1013</td>
<td>40</td>
<td>705</td>
<td>28</td>
<td>675</td>
<td>27</td>
<td>870</td>
</tr>
</tbody>
</table>

N.B. The B dimensions are indicative and refer to the models with larger dimensions. The threaded opening for the connection of the control line is 1/4 NPT female.
Ordering Information
When ordering, complete the ordering guide on this page. Refer to the Specifications section on page 2. Review the description to the right of each specification and the information in each referenced table or figure. Specify your choice whenever a selection is offered.

Ordering Guide

Body Size
☐ DN 300 / NPS 12***

End Connection
☐ CL300 RF Flanged***
☐ CL600 RF Flanged***

Controller Type (Select One)
☐ Type OS9/80X-BP-R***
☐ Type OS9/80X-BPA-D-R***
☐ Type OS9/80X-MPA-D-R***
☐ Type OS9/80X-APA-D-R***
☐ Type OS9/84X-R***
☐ Type OS9/88X-R***
☐ Type OS9/80X-R-PN***
☐ Type OS9/84X-R-PN***

O-ring Material
Standard (-10 to 60°C / 14 to 140°F)
☐ Nitrile (NBR)***
☐ Fluorocarbon (FKM)***

Low Temperature (-20 to 60°C / -4 to 140°F)
☐ Nitrile (NBR)***

Options
☐ Proximity Switch**
☐ Solenoid Valve**
☐ IT/3V Three-way Valve**

Slam-Shut Trip Pressure Setting (Select One)
☐ Overpressure (OPSO) trip only
   Indicate Overpressure Trip Point _____________
☐ Over and Underpressure (OPSO/UPSO) trip
   Indicate Overpressure Trip Point _____________
   Indicate Underpressure Trip Point _____________

Slam-Shut Valve Quick Order Guide

*** Readily Available for Shipment
** Allow Additional Time for Shipment
* Special Order, Constructed from Non-Stocked Parts.
Consult Your local Sales Office for Availability.

Availability of the product being ordered is determined by the component with the longest shipping time for the requested construction.

Specification Worksheet

Application:
Specific Use ____________________________
Line Size ________________________________
Gas Type and Specific Gravity ______________
Gas Temperature __________________________

Pressure:
Maximum Inlet Pressure (P_{max}) ____________
Minimum Inlet Pressure (P_{min}) ____________
Downstream Pressure Setting(s) (P_{2}) ________
Maximum Flow (Q_{max}) ____________________

Performance Required:
Accuracy Requirements?
Need for Extremely Fast Response?

Other Requirements: _________________________