Pressure Management

Hydrometer
Flow Compensated Pressure Reducing Hydrometer

Model 9PM

- Flow and leakage reduction
- Cost effective installation
- Fully self operated
- Burst prevention
- Extends system service life
- Environmentally efficient
- Water and energy saving

The BERMAD Model 9PM integrates a vertical turbine Woltman-type water meter with a diaphragm actuated hydraulic control valve. The 9PM is a Flow Compensated Pressure Reducing hydrometer that automatically and continuously optimizes downstream pressure, correlating valve setting with demand.

Features and Benefits

- Self contained hydro-mechanical
  - Does not rely on electrical power supply
  - Does not require additional pipeline accessories
- Integrated “All-in-One” Control Valve
  - Saves space, cost and maintenance
- Internal Inlet & Outlet Flow Straighteners
  - Saves on straightening distances
  - Maintains accuracy
- Simple design
  - Does not require specialist commissioning
  - Fits all “sites”
- V-Port throttling plug
  - Very stable at low flow
  - Increased valve travel
- Magnetic Drive with Sealed Register
  - Water-free gear train mechanism
  - Reed-switch and Opto pulse-generating modes
  - Various pulse combinations
- In-line serviceable – Easy maintenance

Major Additional Features

- Downstream over pressure guard – 9PM-48
- Hydraulic override – 9PM-09
- Pressure sustaining – 923-PM
- Flow control – 972-PM
**Operation**

The model 9PM Flow Compensated Pressure Reducing Hydrometer is a pilot controlled hydrometer equipped with an adjustable, 2-way pressure reducing pilot linked to an automatically adapting flow compensating pressure adjusting system. The restriction [1] continuously allows flow from the hydrometer inlet into the control chamber [2]. The pilot [3] senses downstream pressure. Should this pressure rise above pilot setting, the pilot throttles, enabling pressure in the control chamber to accumulate, causing the hydrometer to throttle closed, decreasing downstream pressure to pilot setting. Should downstream pressure fall below pilot setting, the pilot releases accumulated pressure, and the hydrometer modulates open. The pilot setting is automatically adjusted according to flow by the cam assembly [4] on the hydrometer indicator stem. The one-way flow control needle valve [5] stabilizes the hydrometer’s reaction in hard regulation conditions, by restricting the flow out of the control chamber. The downstream cock valve [6] enables manual closing.

**Pilot System Specifications**

**Standard Materials:**
- **Pilot:**
  - Body: Stainless Steel 316 or Bronze
  - Elastomers: Synthetic Rubber
- **Spring:** Stainless Steel
- **Tubing & Fittings:** Stainless Steel 316 or Copper & Brass
- **Accessories:** Stainless Steel 316, Brass and Synthetic Rubber Elastomers

**Pilot Adjustment Range:**
- 1 to 16 bar; 15 to 230 psi
- For other adjustment ranges consult factory

**Notes:**
- Inlet pressure, outlet pressure and flow rate are required for optimal sizing and cavitation analysis
- Minimum operating pressure: 0.7 bar; 10 psi.
  - For lower pressure requirements consult factory

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**9PM Assembly Additional Height:**

<table>
<thead>
<tr>
<th>Size</th>
<th>mm</th>
<th>Inch</th>
</tr>
</thead>
<tbody>
<tr>
<td>DN40: 1½”</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>DN50: 2”</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>DN80: 3”</td>
<td>752</td>
<td>29.6</td>
</tr>
<tr>
<td>DN100: 4”</td>
<td>817</td>
<td>32.2</td>
</tr>
<tr>
<td>DN150: 6”</td>
<td>852</td>
<td>33.5</td>
</tr>
<tr>
<td>DN200: 8”</td>
<td>867</td>
<td>34.1</td>
</tr>
<tr>
<td>DN250: 10”</td>
<td>867</td>
<td>34.1</td>
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</tbody>
</table>

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**Pressure Management**

A well-planned pressure management program can significantly reduce not only volumes of real loss, but also maintenance costs by reducing occurrence of bursts and thereby extending the life of the system.

**Comparison Graph**

The below graph is processed from a pressure management site data logging. System pressure was managed in three stages using different pressure reducing techniques:

- **Stage 1 - Fix Outlet PRV**: Pressure was reduced to 48 meters. Minimum night flow is slightly higher than 100 m³/h.
- **Stage 2 - Day/Night Setting PRV**: Night pressure was reduced to 37 meters. Minimum night flow was reduced to 80 m³/h.
- **Stage 3 - Pressure Management Valve**: Using a Flow Compensated PRV the night pressure was reduced to 35 meters. Minimum night flow is reduced to 70 m³/h.
Technical Data

Size Range: DN40-250; 1½–10”
Connections Standard & Pressure Ratings:
  Flanged: ISO 7005-2 (PN10 & 16)
  ANSI B16.42 (Class 150)
  Threaded: Rp ISO 7/1 (BSPP); NPT
Others: Available on request

Valve Patterns: Globe & Angle
Working Temperature: Water up to 50°C; 122°F

Pulse Options:
  Reed Switch Pulse Per:
    10 liter, 100 liter, 1 m³, 10 m³
  Opto Electric Pulse Per:
    0.1, 1 US gallon

For pulse per size selection and combined pulses options refer to 900 series engineering section or ordering guide

Pulse Electric Data:
  Reed Switch:
    Switching voltage: max. 24 VAC/DC
    Switching current: max. 0.1A
  Opto Electric:
    Supply voltage: 5-12 VDC
    Output current: 200 mA

Differential Pressure Calculation

\[ \Delta P = \left( \frac{Q}{Kv;Cv} \right)^2 \]

\( \Delta P \) = Differential Pressure for fully open valve (bar; psi)
\( Q \) = Flow rate (m³/h; gpm)
\( Kv \) = Metric system - valve flow coefficient
  (flow in m³/h at 1 bar \( \Delta P \) with 15°C water)
\( Cv \) = US system - Valve flow coefficient
  (flow in gpm at 1 psi \( \Delta P \) with 60°F water)

\( Cv = 1.155 \times Kv \)

Flow Data, Dimensions & Accuracy

<table>
<thead>
<tr>
<th>Flow Data</th>
<th>DN / Size</th>
<th>Threaded</th>
<th>Flanged</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>40</td>
<td>50</td>
<td>65</td>
</tr>
<tr>
<td></td>
<td>1.5</td>
<td>2”</td>
<td>3”</td>
</tr>
<tr>
<td></td>
<td>Kg / gpm</td>
<td>Kg / gpm</td>
<td>Kg / gpm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>41</td>
<td>47</td>
</tr>
<tr>
<td></td>
<td>L mm; inch</td>
<td>250</td>
<td>9.8</td>
</tr>
<tr>
<td></td>
<td>H mm; inch</td>
<td>137</td>
<td>5.4</td>
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<tr>
<td></td>
<td>W mm; inch</td>
<td>270</td>
<td>10.6</td>
</tr>
<tr>
<td></td>
<td>R mm; inch</td>
<td>7.2</td>
<td>0.3</td>
</tr>
<tr>
<td></td>
<td>Weight Kg</td>
<td>140</td>
<td>309</td>
</tr>
</tbody>
</table>

Standard Materials:

[1] Control Head:
  Housing: Plastic with Brass cover
  Register capsule: Glass
[2] Body & Cover:
  Ductile Iron to EN1563; ASTM A536
[3] Impeller Housing Assembly:
  [3.1] Seal Seat: Synthetic Rubber
  [3.2] V-Port: Stainless Steel 304
  [3.3] Impeller Housing and Lower Flow Straightener:
    Glass Fiber Reinforced Nylon
[4] Impeller Assembly:
  [4.2] Upper Flow Straightener: Glass Fiber Reinforced Nylon
  [4.3] Impeller: Polypropylene
[5] Closure Assembly:
  [5.1] Diaphragm: Synthetic Rubber or NR
  [5.2] Closure: Glass Fiber Reinforced Nylon
[6] Spring: Stainless Steel 302

Internal Bolts & Nuts: Stainless Steel 316 & 304
External Bolts & Nuts: Stainless Steel 316 or Zinc-Cobalt Plated Steel

Coating: Fusion Bonded Epoxy, RAL 5005 (Blue), 250 mm approved for drinking water or Polyester Blue RAL 5010

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Flows and Dimensions

<table>
<thead>
<tr>
<th>Flow Data</th>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>L / H / W</td>
</tr>
<tr>
<td>Q1 Minimum Flow</td>
<td>4.5 m³/h; gpm</td>
</tr>
<tr>
<td>Q2 Transitional Flow</td>
<td>6.7 m³/h; gpm</td>
</tr>
<tr>
<td>Qn Nominal Flow</td>
<td>12 m³/h; gpm</td>
</tr>
<tr>
<td>Q3 Permanent Flow</td>
<td>24 m³/h; gpm</td>
</tr>
<tr>
<td>Q4 Maximum Flow</td>
<td>48 m³/h; gpm</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Flow Data</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1 / Q2</td>
<td>1.6</td>
</tr>
<tr>
<td>Q3 / Q4</td>
<td>1.6</td>
</tr>
</tbody>
</table>

1/2 ISO 4024-1-1993
1/2 Short time