

## 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.

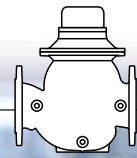


### Features and Benefits

- **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**

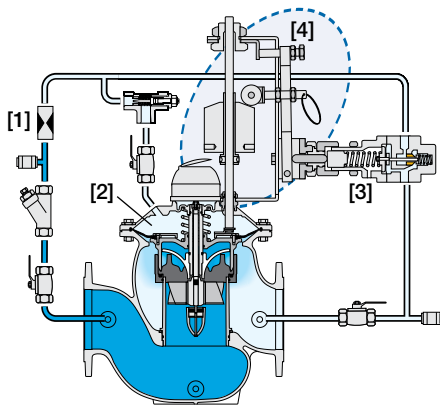
### Major Additional Features

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

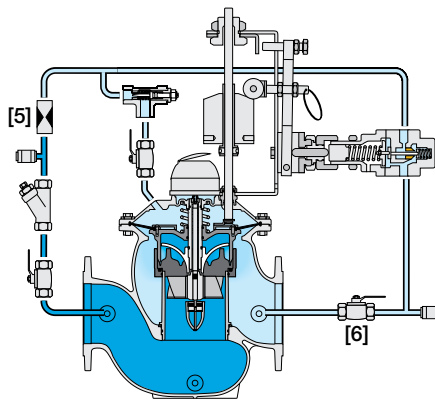


## Operation

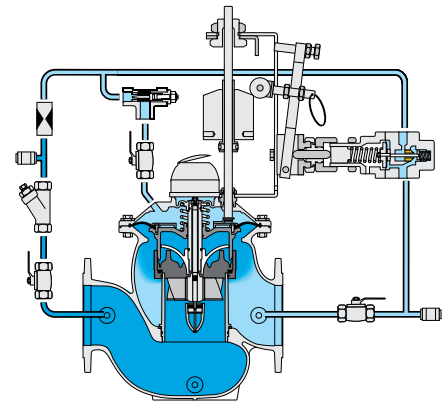
The model 9PM Flow Compensated Pressure Reducing Hydrometer is a pilot controlled hydrometer equipped with an adjustable, 2-way pressure reducing pilot linked to an automatically adapting flow compensating pressure adjusting system. The restriction [1] continuously allows flow from the hydrometer inlet 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.



Low Demand – Low Setting



Medium Demand – Medium Setting



High Demand – High Setting

## 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:

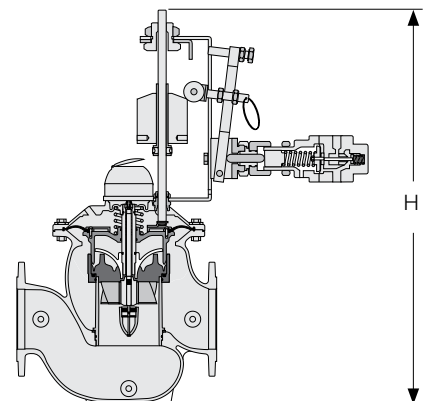
1 to 16 bar ; 15 to 230 psi  
 For other adjustment ranges consult factory

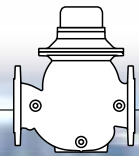
### Notes:

- 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

### 9PM Assembly Additional Height:

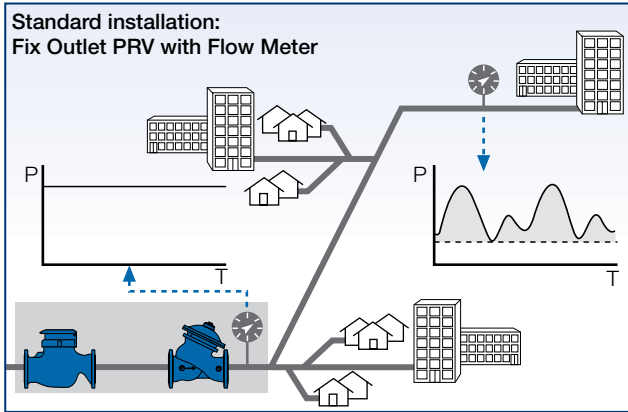
Size	mm	Inch
DN40; 1½"	N/A	N/A
DN50; 2"	N/A	N/A
DN80; 3"	752	29.6
DN100; 4"	817	32.2
DN150; 6"	852	33.5
DN200; 8"	867	34.1
DN250; 10"	867	34.1



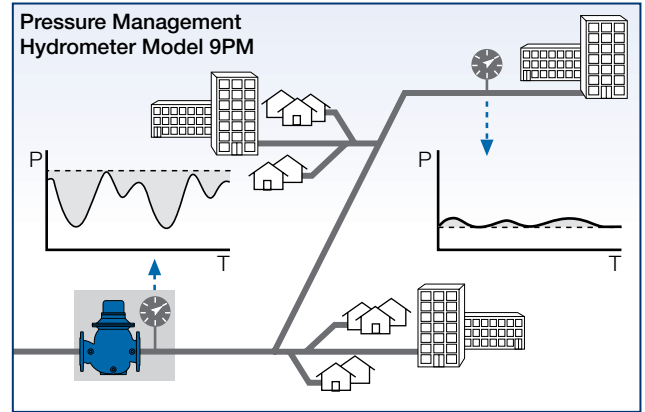


## Pressure Management

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.



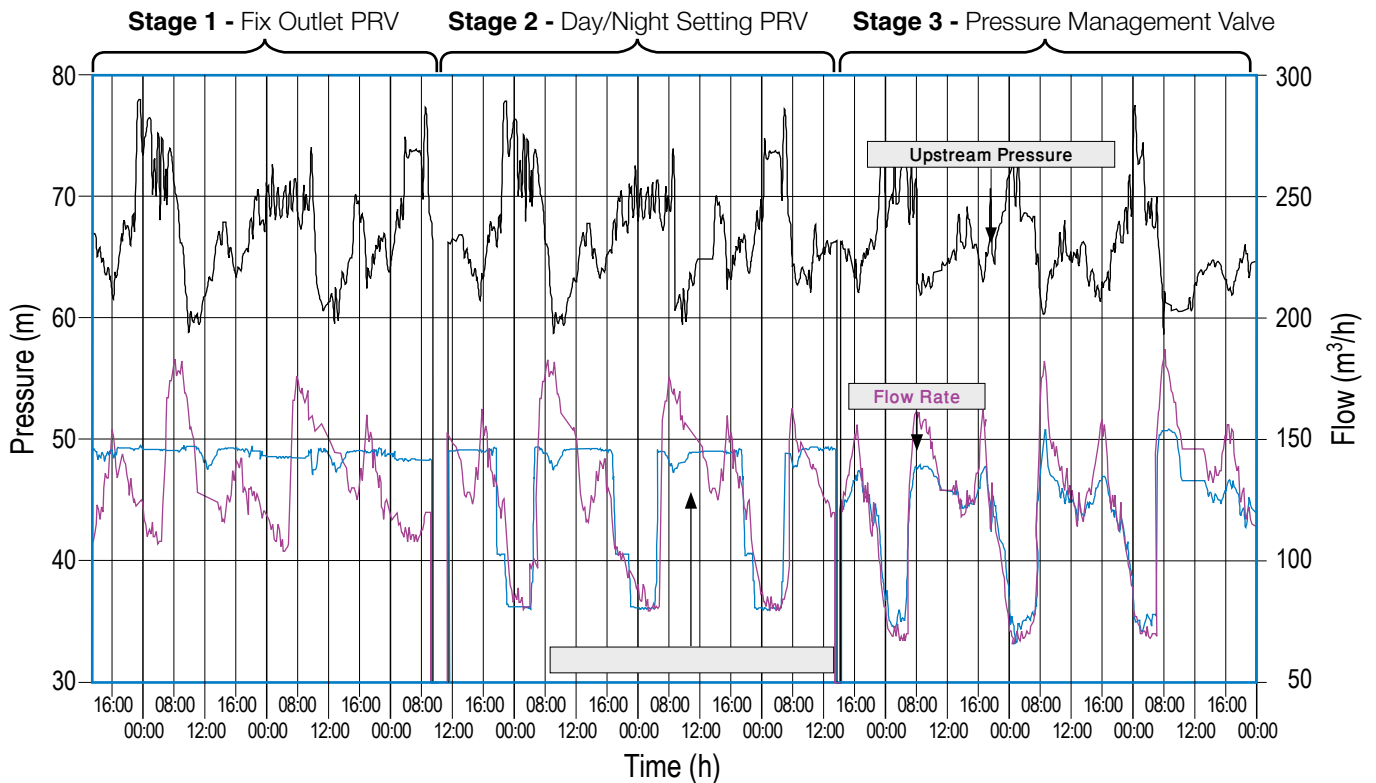
Fixed Outlet PRVs are set to maintain a constant low downstream pressure, ensuring sufficient pressure at the systems critical point during peak demand (when line friction head loss is highest). The shaded area represents the hours and levels when pressure is higher than required.  
Flow meter installation requires upstream and downstream straight pipe segments.



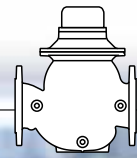
The Flow Compensated Pressure Reducing Hydrometer, BERMAD Model 9PM is designed to automatically and continuously optimize downstream pressure, correlating valve setting with demand. As a result, the average network pressure dramatically decreases, reducing system leakage, bursts, maintenance and energy costs. The shaded area represents the hours and levels of reduced leakage. The unique construction of the hydrometer enables compact and cost effective installation.

## 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:** Pressure was reduced to 48 meters. Minimum night flow is slightly higher than 100 m<sup>3</sup>/h
- Stage 2:** Night pressure was reduced to 37 meters. Minimum night flow was reduced to 80 m<sup>3</sup>/h
- Stage 3:** Using a Flow Compensated PRV the night pressure was reduced to 35 meters. Minimum night flow is reduced to 70 m<sup>3</sup>/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 (BSP.P); 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, 1m<sup>3</sup>, 10m<sup>3</sup>

1, 10, 100, 1000 US gallon

**Opto Electric Pulse Per:**

1 liter, 10 liter

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 type: complementary

Output current: 200 mA

**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:**

[4.1] **Guide:** Stainless Steel 303

**Pivots, Bearings, and Thrust Bearings:**

Tungsten Carbide

[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

**O-Rings:** Synthetic Rubber

**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

### Differential Pressure Calculation

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

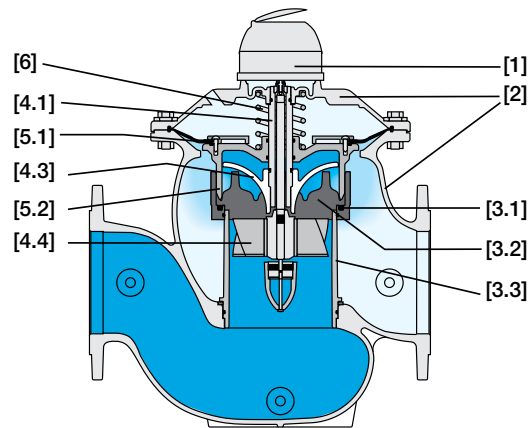
$\Delta P$  = Differential Pressure for fully open valve (bar; psi)

$Q$  = Flow rate (m<sup>3</sup>/h; gpm)

$Kv$  = Metric system - valve flow coefficient  
(flow in m<sup>3</sup>/h at 1 bar  $\Delta P$  with 15°C water)

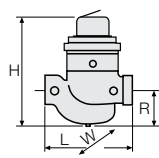
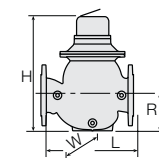
$Cv$  = US system - Valve flow coefficient  
(flow in gpm at 1 psi  $\Delta P$  with 60°F water)

$Cv = 1.155 Kv$



### Flow Data, Dimensions & Accuracy

	DN / Size	Threaded						Flanged									
		40	1.5	50	2"	50	2"	80	3"	100	4"	150	6"	200	8"	250	10"
Flow data	Kv / Cv	41	47	46	53	46	53	115	133	147	170	430	497	550	636	550	636
	L mm; inch	250	9.8	250	9.8	250	9.8	300	11.8	350	13.8	500	19.7	600	23.6	600	23.6
	W mm; inch	137	5.4	137	5.4	165	6.5	210	8.3	250	9.8	380	15.0	380	15.0	405	15.9
	R mm; inch	95	3.7	95	3.7	95	3.7	123	4.8	137	5.4	216	8.5	228	9.0	228	9.0
	H mm; inch	270	10.6	277	10.9	277	10.9	382	15.0	447	17.6	602	23.7	617	24.3	617	24.3
	Weight Kg; lb	7.2	15.9	7.3	16.1	10	22	23	51	30	66	70	154	92	203	140	309
Accuracy	Q1 Minimum Flow $\pm 5$ m <sup>3</sup> /h; gpm	0.8	3.5	0.8	3.5	0.8	3.5	1.2	5.3	1.8	7.9	4	17.6	6.3	27.7	6.3	27.7
	Q2 Transitional Flow $\pm 5$ (m <sup>3</sup> /h/gpm)	1.3	5.7	1.3	5.7	1.3	5.7	3	13.2	4.5	19.8	10	44	15.8	69.6	15.8	69.6
	Qn Nominal Flow $\pm 2$ m <sup>3</sup> /h; gpm <sup>(1)</sup>	15	66	15	66	15	66	40	176	60	264	150	660	250	1100	400	1761
	Q3 Permanent Flow $\pm 2$ m <sup>3</sup> /h; gpm	25	110	40	176	40	176	100	440	160	704	250	1100	400	1761	400	1761
	Q4 Maximum Flow $\pm 2$ m <sup>3</sup> /h; gpm <sup>(2)</sup>	31	136	50	220	50	220	125	550	200	880	313	1378	500	2201	500	2201
	Q2/Q1		1.6		1.6		1.6		2.5		2.5		2.5		2.5		2.5
	Q3/Q1		31		50		50		83		89		63		63		63
	Class ISO 4064-1-1993		A		A		A		B		B		B		B		B



<sup>(1)</sup> ISO 4064-1-1993

<sup>(2)</sup> Short time



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