PFM System
(Pressure and Flow Modulating)
.....for Constant Pressure applications
The EBSRAY RV Series PFM (Pressure and Flow Modulating) System Equipment is designed and precision built for applications in pumping systems which demand accurate Constant Pressure Control (CPC) or Flow Modulation/Control.

**Fields of Application**
Ebsray PFM Systems are widely utilised throughout process industries for many applications including:
- Filling/Packaging machines requiring Constant Pressure Control (CPC)
- Grease/Lube Oil Blending Plants (LOBP)
- Sensitive pumping systems which demand accurate pressure maintenance for sensitive equipment protection e.g. Aircraft Refuelling, Filling Machines
- Fluid processes requiring remote regulation of flow via pressure sensing and electronic control.

**Features**
- Constant Pressure Control (CPC) irrespective of product viscosity or viscosity changes.
- Smooth, vibration-free and quiet operation.
- Infinitely adjustable pressure settings from either local or remote stations - manual, automatic or PLC control.
- Control mediums can be pneumatic or hydraulic.
- In-Line PFM Systems can be used in existing systems equipped with most pump brands or pump types.
- Integral PFM System suits most models of Ebsray V Series Sliding Vane Pumps and all self draining V Series pump models.
- Material options to suit most process industries.
- Simple design - instantaneous response time.
- Flow rates controlled from zero to 100% of pump output.

**Why use an EBSRAY PFM System?**
Constant Pressure Control (CPC) or flow modulation and control of pump systems historically required expensive variable speed drives, complicated variable displacement pumps or unpredictable and inefficient bypass type valves. The Ebsray PFM System is a cost effective alternative which enables constant pressure control from simple input signals with most types and principles of pumps or pumping systems - irrespective of changes in viscosity.

**Specifications**
Refer Page 4.

**Assured Quality and Performance**
EBSRAY’s ISO 9001 Quality System assures compliance with the highest safety and quality standards demanded. All EBSRAY PFM Systems are manufactured under strict guidelines and procedures. Quality inspections and tests during production guarantee integrity and performance in accordance with the specifications.
Operating Principle

The Ebsray PFM System accurately maintains the required constant pressure by sensing the slightest variations in system pressures. The Control Piston acts on one side and control pressure (P<sub>2</sub>) acting on the other. It is fixed to a hydraulically balanced Spool Valve and any change in system pressure above the set pressure causes the valve to react. Constant pre-set pressure is thus maintained and modulated. A ratio of ≈ 2.6 : 1 (refer models) between the system pressure side (P<sub>1</sub>) of the Control Piston and the control pressure side (P<sub>2</sub>) allows standard plant air utilisation. e.g. plant air can be used to attain an infinitely variable range of system pressures from zero to maximum. e.g. 500 kPa control pressure ≈ 1300 kPa system pressure etc.

Therefore, variable system operating pressures may be easily set and adjusted by a simple pressure regulator. This can be operated locally or from a remote station - manual, automatic or PLC controlled. As the PFM System function relies only on downstream pressure (P<sub>1</sub>), product viscosity variation or pump suction conditions (within the NPSH<sub>r</sub> of the pump) have little or no effect upon the PFM’s constant pressure control. In addition, reaction time of the PFM function is virtually unaffected by viscosity change. Instantaneous response to any system pressure change is attained with a smooth ‘spike-free’ reaction by the Ebsray PFM System. This benefit thus minimises pressure shocks and vibration which are constant problems to sensitive equipment e.g. filling machine seals, meters, control valves etc.

Integral PFM System

Specific pump models in the Ebsray V Series Vane Pump Range (including all the Self-draining models) may be fitted with the Integral PFM System.

The operating principle and functionality of the constant pressure control is identical to the In-Line PFM System. However, a cost effective and simple installation is attained by this simple, compact and integral design.

In addition, the Integral PFM doubles as an accurate pump pressure relief valve in cases where this feature is required for system or equipment protection.
Installation

In-Line PFM System

The Ebsray In-Line PFM System is designed for installation in the discharge pipework - either immediately downstream of the product pump (any brand, type or principle), or nearer to the equipment being afforded constant pressure control. e.g. filling/packaging machines etc.

Many LOBP blending systems benefit from a facility to either partially or fully recirculate (jet line mixing) the entire storage tank contents for constant blending operations - e.g. lube oils, greases, additives etc. The In-line PFM System achieves this function without any additional equipment.

Similar to the Integral PFM Systems, the In-Line PFM System can double as a system Bypass Valve to afford accurate overpressure protection in addition to its constant pressure control function.

Specifications/Dimensions

Flow Rates
- RV32......... to 800 l/min
- RV33......... to 1500 l/min
- RV34......... to 3000 l/min

Viscosity range................. 1 to 500,000 cSt
Max Working Pressure............. 1850 kPa
Hydrostatic Test Pressure .... 3000 kPa
Temperature range............... 0 to 150°C

Notes
- Viscosity dependant - refer Performance Graph or Ebsray
- Refer to Flange Rating Charts for pressure/temperature limits
- Flanges on all models are Class 150 ANSI

<table>
<thead>
<tr>
<th>PFM Model</th>
<th>Dimensions (millimetres)</th>
<th>System Pressure to Control Pressure Ratio</th>
<th>Weight Kg</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>RV32</td>
<td>100</td>
<td>160</td>
<td>405</td>
</tr>
<tr>
<td>RV33</td>
<td>120</td>
<td>210</td>
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<tr>
<td>RV34</td>
<td>150</td>
<td>280</td>
<td>645</td>
</tr>
</tbody>
</table>

Notes:
- <sup>1</sup> Viscosity dependant - refer Performance Graph or Ebsray
- <sup>2</sup> Refer to Flange Rating Charts for pressure/temperature limits
- <sup>3</sup> Flanges on all models are Class 150 ANSI

System Pressure to Control Pressure Ratio

Control Medium

NOTE: All specifications and illustrations are typical only and subject to revision without notice. Certified data available on request.

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