

# EBSRAY PUMPS



***PFM System***  
*(Pressure and Flow Modulating)*  
**.....for Constant Pressure applications**

Quality System  
Quality  
Endorsed  
Company  
ISO 9001  
Lic 3332  
Standards Australia

HEAD OFFICE AND WORKS



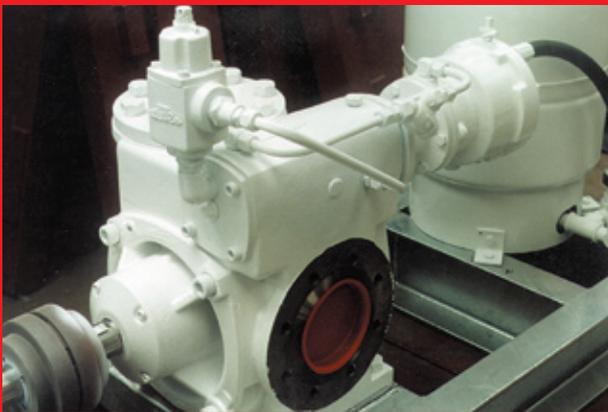
# RV Series - PFM System Equipment



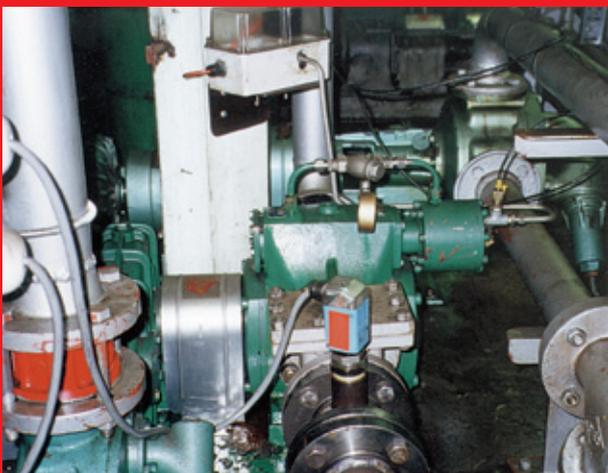
Integral PFM system in Ebsray V35 Sliding Vane Pumpset



In-Line PFM Systems for modern LOBP operation installed with local control pressure regulator



Ebsray V40 Pumpset with accumulator-controlled PFM system for mobile aircraft refuelling operations



Remote Electronic controlled Integral PFM System for dual head drum filling equipment in LOBP

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.

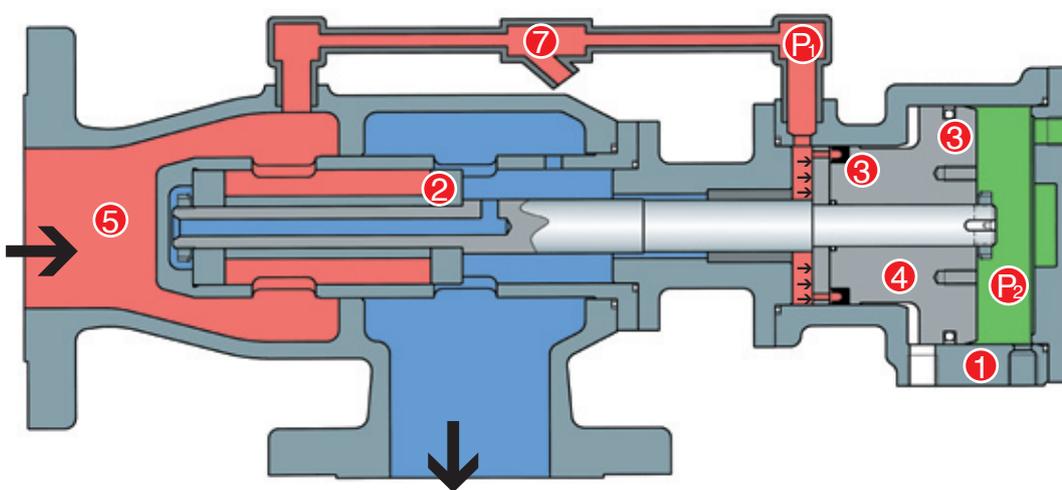
## Assured Quality and Performance

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.

**Engineered in Australia**

# Operating Principle



- 5 Pumped Product**
  - ▶ From pump
- 6 Control medium**
  - ▶ Pneumatic as standard - normally to 700 kPa plant air
  - ▶ Hydraulic available - specify when required
  - ▶ Can combine local pneumatic accumulator for hydraulic actuation

- 7 Pressure sensing line with Filter**
  - ▶ Transfers downstream system pressure to Control Piston for modulation
  - ▶ Filter for ensuring cleanliness of product at Control Piston seals
  - ▶ Materials compatible with major casing materials and liquid pumped

- 1 PFM Cylinder**
  - ▶ Houses and seals Control Piston
  - ▶ Corrosion/abrasion resistant surfaces for accurate low friction movement and extended life of Piston seals
  - ▶ Accommodates condensate drain and vent to atmosphere

- 3 Control Piston Seals**
  - ▶ High pressure capability for reliable operation
  - ▶ Long service life, low friction
  - ▶ Product compatible materials
  - ▶ Simple to service

- 2 Spool Valve and Piston Assembly**
  - ▶ Hydraulically balanced Spool Valve
  - ▶ Low inertia for smooth, 'spike-free' system operation
  - ▶ Spool Valve design for quiet and controlled movement
  - ▶ Can be actuated to 'dump' pressure to zero on command
  - ▶ Fail-safe design

- 4 Control Piston**
  - ▶ System pressure ( $P_1$ ) acts on smaller area
  - ▶ Control pressure ( $P_2$ ) acts on larger area
  - ▶ Limited travel - Cannot exceed max or min positions

## Operating Principle

The Ebsray PFM System accurately maintains the required constant pressure by sensing the slightest variations in system pressures. The Control Piston (4) has system pressure ( $P_1$ ) acting on one side and control pressure ( $P_2$ ) acting on the other. It is fixed to a hydraulically balanced Spool Valve (2) 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  $\approx 2.6 : 1$  (refer models) between the system pressure side ( $P_1$ ) of the Control Piston and the control pressure side ( $P_2$ ) 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  $\approx$  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 ( $P_1$ ), product viscosity variation or pump suction conditions (within the NPSHr 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.

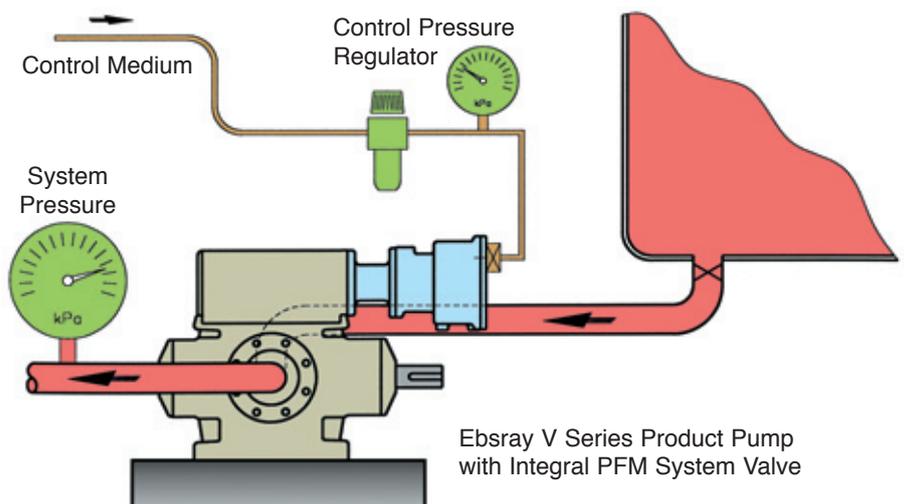
## Installation

### 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.



Ebsray V Series Product Pump with Integral PFM System Valve

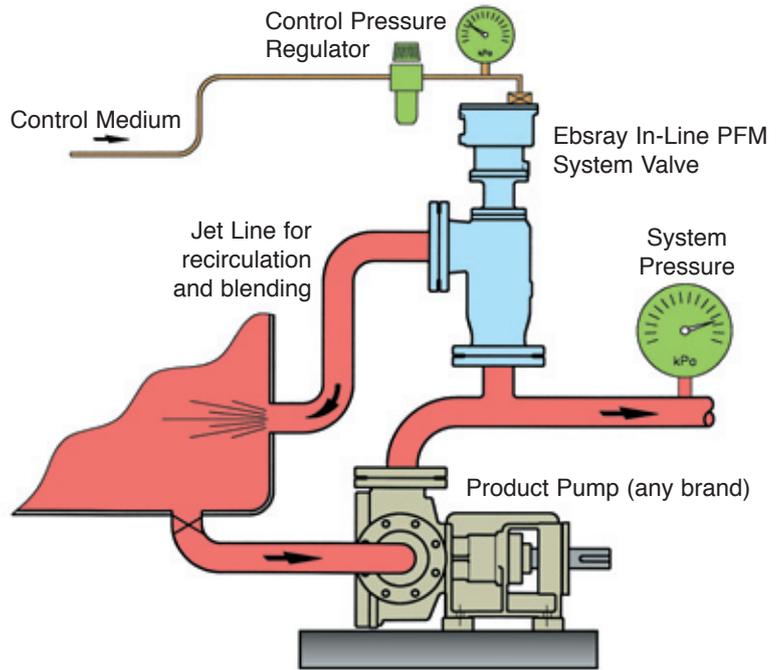
# Installation

## 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.

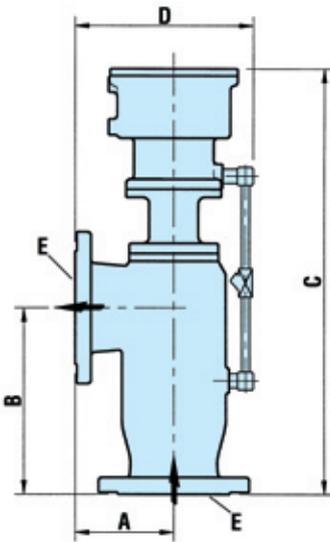


## Specifications/Dimensions

Flow Rates <sup>①</sup> 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<sup>②</sup>..... 1850 kPa  
 Hydrostatic Test Pressure .... 3000 kPa  
 Temperature range<sup>②</sup> ..... 0 to 150°C

**Major Materials**  
 Casing ..... Ductile Iron-  
 ASTM A395  
 or Cast Steel  
 Elastomers ... Nitrile/Viton  
 Piston Seals . PTFE



PFM Model	Dimensions (millimetres)					System Pressure to Control Pressure Ratio	Weight Kg
	A	B	C	D	E <sup>③</sup> Nominal Pipe size (DN) mm - inches		
RV32	100	160	405	192	50 - 2"	2.71 : 1	20
RV33	120	210	495	228	80 - 3"	2.66 : 1	38
RV34	150	280	645	274	100 - 4"	2.57 : 1	60

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

- 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

DISTRIBUTED BY:

### EBS-RAY PUMPS PTY. LIMITED

ACN 000 061 003  
 Head Office and Works  
 628 Pittwater Road  
 Brookvale NSW 2100 Australia  
 Telephone (61 2) 9905 0234  
 Fax (61 2) 9938 3825  
 www.ebsraypumps.com.au

Branch Office Victoria  
 Phone (03) 9706 7263  
 Fax (03) 9706 7312  
 Branch Office Queensland  
 Phone (07) 3260 7411  
 Fax (07) 3260 7422



Quality Endorsed Company

