

MESURFLO® PRESSURE INDEPENDENT CONTROL VALVE

TECHNICAL OVERVIEW

**USING MESURFLO PICV WITH
A MODULATING TEMPERATURE
CONTROL VALVE**





HAYS FLUID CONTROLS has been a recognized leader in the flow control valve industry for more than four decades. Inside corporate towers, luxury hotels, educational institutions, office complexes and exclusively in vessels of the U.S. Navy fleet, Hays Fluid Controls valves work quietly, efficiently and dependably. The exclusive patented Mesurflo® valve, manufactured by Hays Fluid Controls, provides proper system balance resulting in maximum temperature and humidity control with a consistent record of excellence. The Mesurflo valve conserves energy by ensuring each terminal unit receives the designated chilled water or hot water flow.

THE MESURFLO PRESSURE INDEPENDENT

CONTROL VALVE® (PICV) is the foremost choice for automatic control valves in the commercial HVAC industry. Its design combines the unique feature of the Mesurflo balance valve with a modulating temperature control valve. This allows each valve to serve its own design function. Mesurflo is considered the 'gold standard' in automatic control valve technology. Mesurflo efficiently controls flow in water source heat pumps, fan coils, VAV boxes and air handlers, to name a few. For more than four decades, the U.S. Navy has used Mesurflo exclusively to control chilled water systems on its submarines, surface vessels and weapons systems such as the Patriot Missile Launcher.

PERFORMANCE SYNERGY

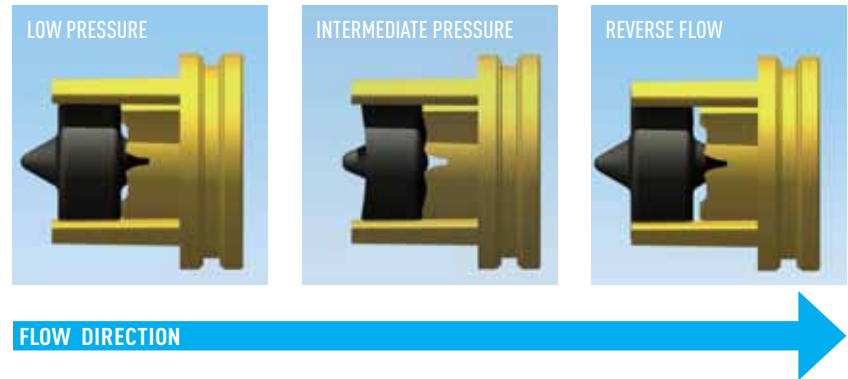
RELIABLE, NON-TURBULENT FLOW WHILE WORKING WITH OTHER VALVES

The Mesurflo® balance valve is a constant flow rate device. Independent of pressure, it cannot be described with a CV since it is a variable orifice that changes to govern flow.

Figure A

FLOW PRESSURE ON MESURFLO PICV

Mesurflo's distinctive design limits flow through the valve by the deflection of a diaphragm on an orifice plate. As flow increases through the flow control, the pressure across the diaphragm increases. This pressure deflects the diaphragm decreasing the open area between the diaphragm and the orifice plate (Figure A). Since the Mesurflo PICV limits the flow rate of fluid - independent of pressure - performance is evaluated strictly in terms of flow.

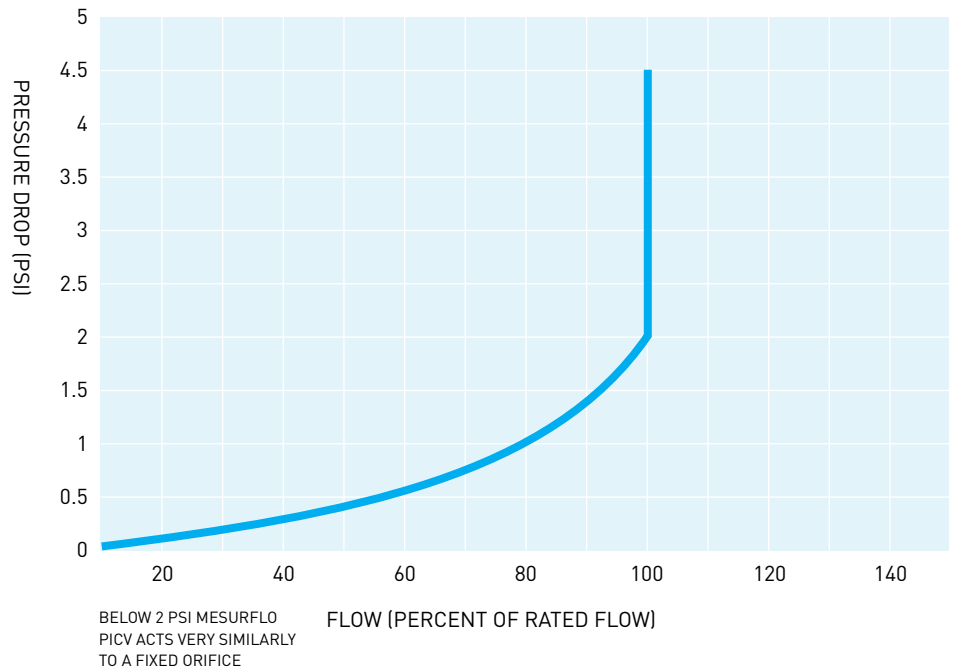


The orifice plate is specifically designed to maintain a constant flow rate through the device, from 2 to 80 psi differential. Below 2 psi, the minimum operating pressure for most Mesurflo devices, Mesurflo will operate similarly to a fixed orifice, or constant CV. In terms of flow, the Mesurflo will produce a restriction proportional to flow rate squared. Above 2 psid, the restriction responds to pressure changes maintaining constant flow. This will maintain a constant flow through the Mesurflo (Figure B).

Figure B

MESURFLO PICV PERFORMANCE

ABOVE 2 PSI, THE MESURFLO PICV ACTS TO MAINTAIN THE FLOW AT THE RATED VALUE ONCE IT HAS BEEN REACHED



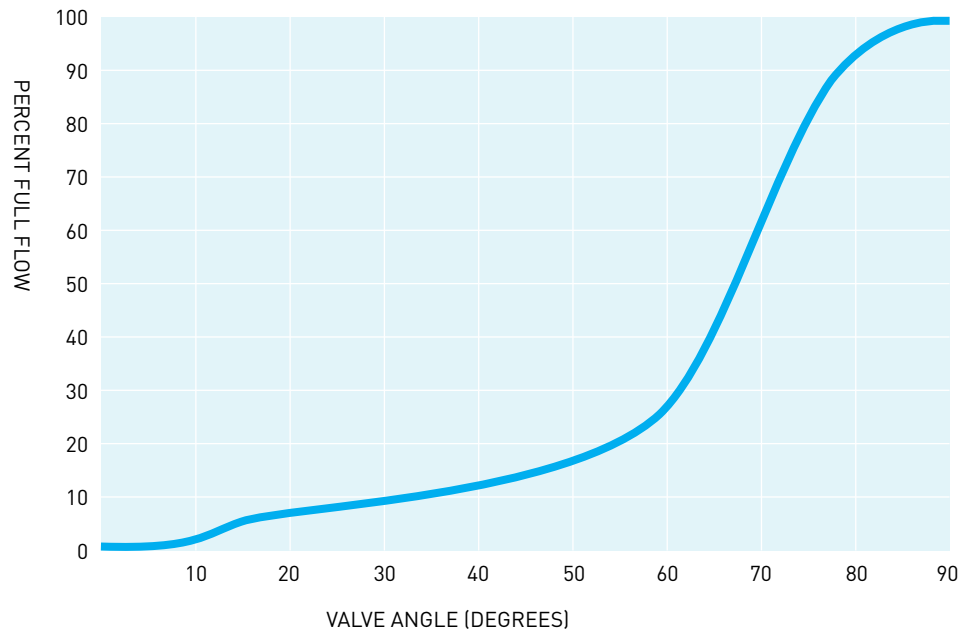
BEFORE MESURFLO® PICV

LIMITATIONS OF TYPICAL CONTROL VALVES

Modulating control valves regulate flow by changing the open area of the valve, creating a different CV for each position of the valve.

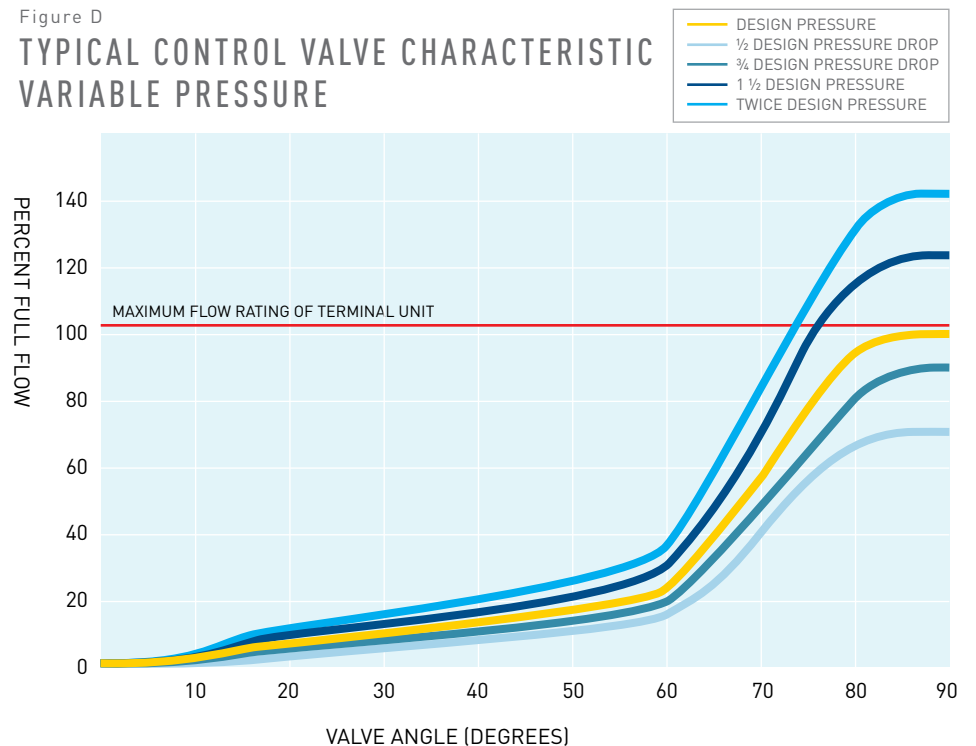
Performance for a typical equal percentage valve for single pressure is shown in Figure C.

Figure C
TYPICAL CONTROL VALVE CHARACTERISTIC
SINGLE PRESSURE



With the typical equal percentage valve, the varying pressure on the flow rate through the valve can be seen in Figure D. Note that at all points above the design pressure, the flow can exceed the design flow rate.

Figure D
TYPICAL CONTROL VALVE CHARACTERISTIC
VARIABLE PRESSURE



INTRODUCING THE MESURFLO® PICV

SMOOTH OPERATION WITH EXISTING VALVES ENSURED

MESURFLO PICV DELIVERS:

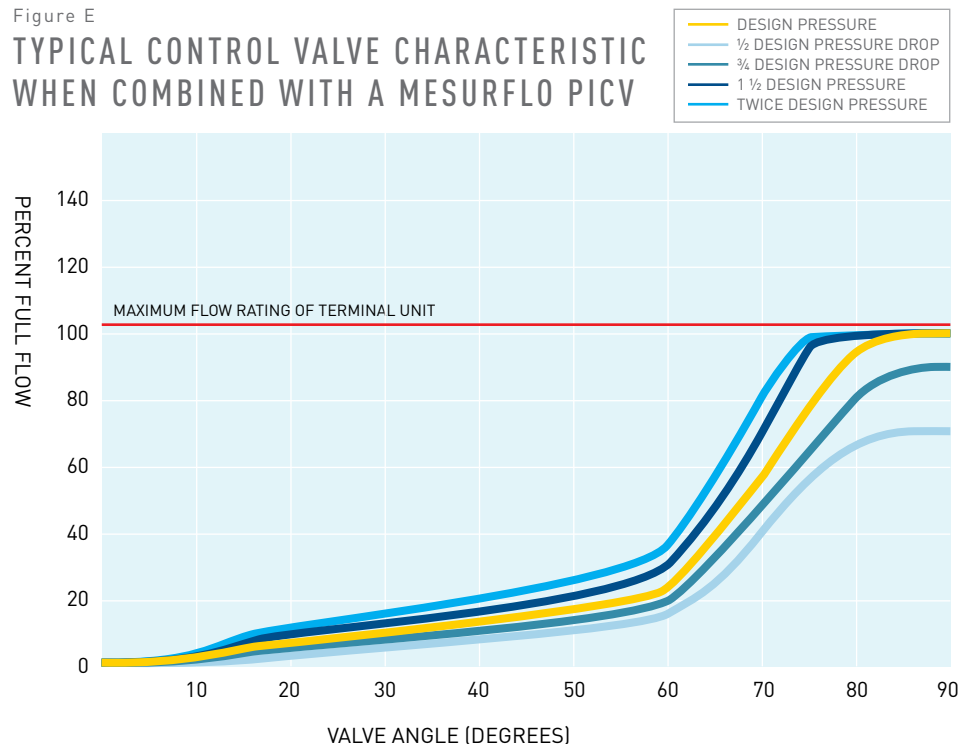
- Durability: Designed with no tiny springs or thin rubber diaphragms that can weaken or rupture.
- Value: Warranted for life of the HVAC system with technology used by the U.S. Navy for over 40 years.
- Stability: No oscillation or vibration as experienced with spring-type valves.
- Clog Resistance: Changing orifice opening self-cleans passing debris.
- Quiet: No metal internals.
- Cost Efficiencies: Eliminates time-consuming system balancing and ensures proper flow at all terminal units.



The Mesurflo PICV prevents the operating system from experiencing excessive flow. In conditions where higher than normal pressures occur, Mesurflo PICV lowers total system flow. This saves energy and further reduces costs. Mesurflo PICV also protects equipment from the detrimental effects of flow-induced erosion. (Figure E).

Figure E

TYPICAL CONTROL VALVE CHARACTERISTIC WHEN COMBINED WITH A MESURFLO PICV



IMPROVED PERFORMANCE WITH MESURFLO® PICV

SPECIALLY DESIGNED BALL VALVE GUARANTEES PRECISION

As the control signal from the thermostat demands less than rated flow, the characterized control valve portion gains authority to control the flow.

Even as the pressure changes, this characterized control valve combines with the specially designed actuator to control the flow. The control valve's equal percentage characteristic guarantees a linear output.

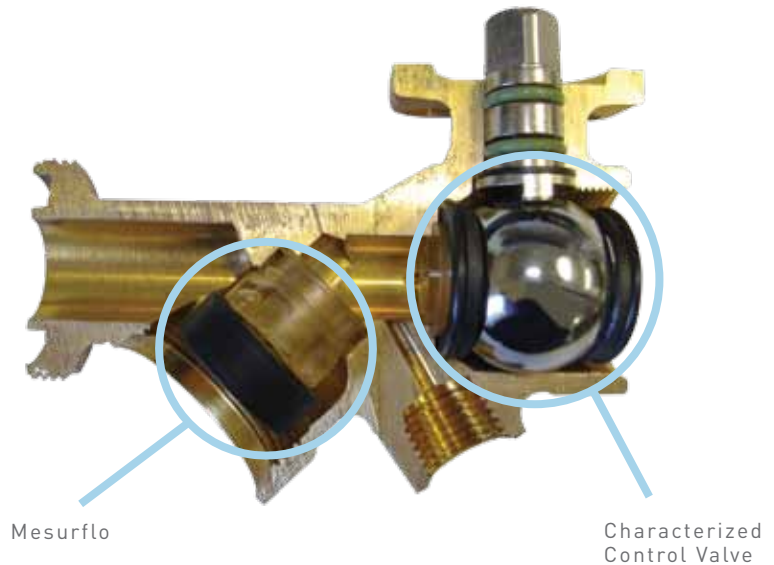
With Mesurflo PICV, all movement is external to the valve in modulating conditions. The uniquely designed ball valve and characterized disc combination combine to produce the required flow rate.

The flow then is maintained solely by the movement of one element – the ball valve. The actuator utilizes sophisticated algorithms to precisely position the valve. This eliminates over-reaction and sluggishness (Figure F).

At flow rates below the design point, no interaction for authority occurs between the Mesurflo and the control valve, as the Mesurflo acts like a fixed orifice. During this condition, unlike spring-type valves, the Mesurflo still functions to damp out any pressure spikes to maintain constant set flow and eliminate any branch-to-branch interaction in the system. The impact on the control system of limiting flow to the rated maximum is minimal, due to the diminishing returns of heat exchangers.

Mesurflo PICV prevents operating systems from experiencing excessive flow in high rises around the world.

Figure F
HEAT TRANSFER PERFORMANCE



COST REDUCTIONS WITH MESURFLO® PICV

BENEFITS OF TEMPERATURE FEEDBACK SYSTEM

Modulating valves controlled by a temperature feedback system benefit from the Mesurflo PICV, providing the same benefit as leading competitive pressure independent control valves.

Figure G

CONTROL VALVE CHARACTERISTICS

A characterized disc in the inlet of the central valve converts the valve characteristic to a linear output.

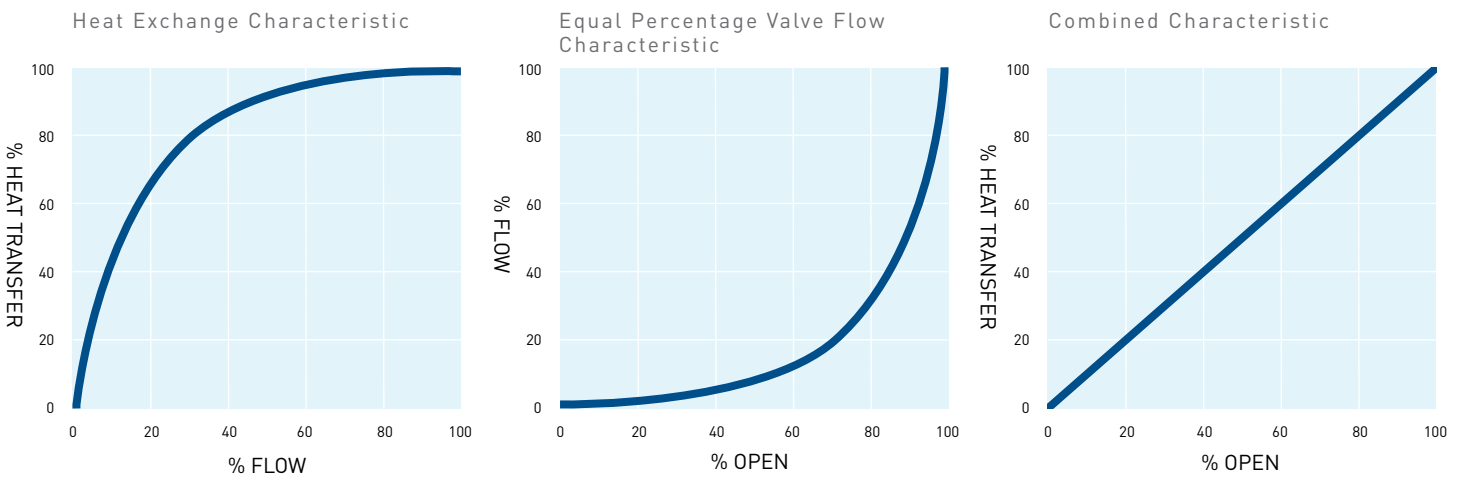
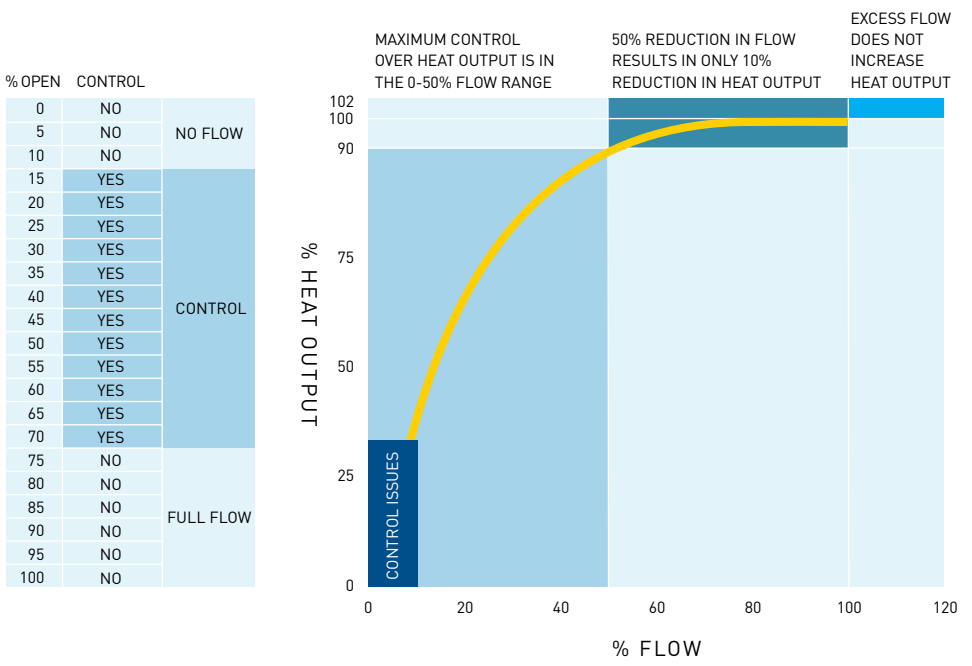


Figure H

HEAT EXCHANGE CURVE

The effective control range is between 15% to 70% open.



SPECIFICATIONS

ACTUATOR	
Voltage	24 Vac +20%, -15% @ 50/60 Hz
Power Requirements	2.3 W/1.6W (AC/DC)
Control Signal	2-Position, floating or proportional; half wave rectified power supply
Manual Operating Lever/Position Indicator	Standard on all models
Auxiliary End Switch (optional)	SPST 24 Vac/Vdc, 101 mA to 5 A max
Materials	Thermoplastic base and cover. Approved for use in air plenums
Shipping & Storage Temperature Limit	-40 to 169 °F [-40 to 76°C]
Operating Temperature Limit at Max Fluid Temp	
Proportional	32 to 140 °F [0 to 60 °C]
Humidity	5 to 95% relative humidity, non-condensing
Locations	NEMA 2, IEC IP31 Indoor Use Only
VALVE	
Service	Hot and chilled water, up to 60% glycol
System Static Pressure Limit	600 psi (4137 kPa)
Fluid Temperature Limit	32 to 255°F
Close-Off Pressure	130 psi
Differential Pressure	80 psi
Rangeability	Greater than 300:1
Body Material	Forged brass
Stem Material	Stainless steel anti-blow out stem with dual Viton™ o-rings
Ball Material	Chrome plated brass
Seat Material	PTFE
Characterized Insert	Glass-filled PEEK. Engineered resin, very stable compatible HVAC fluids

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