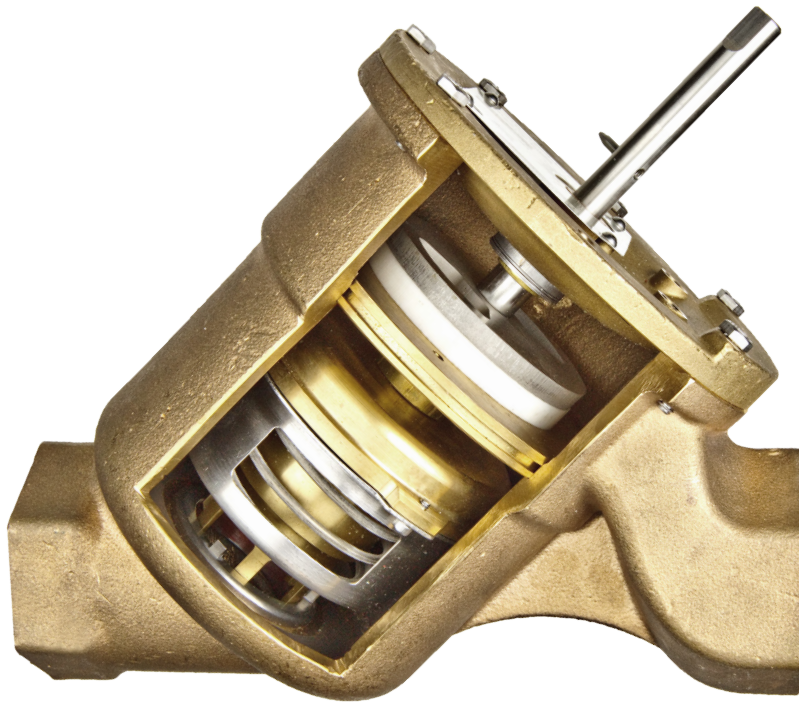




FLOW CONTROL  
INDUSTRIES, INC.

# Product Catalog

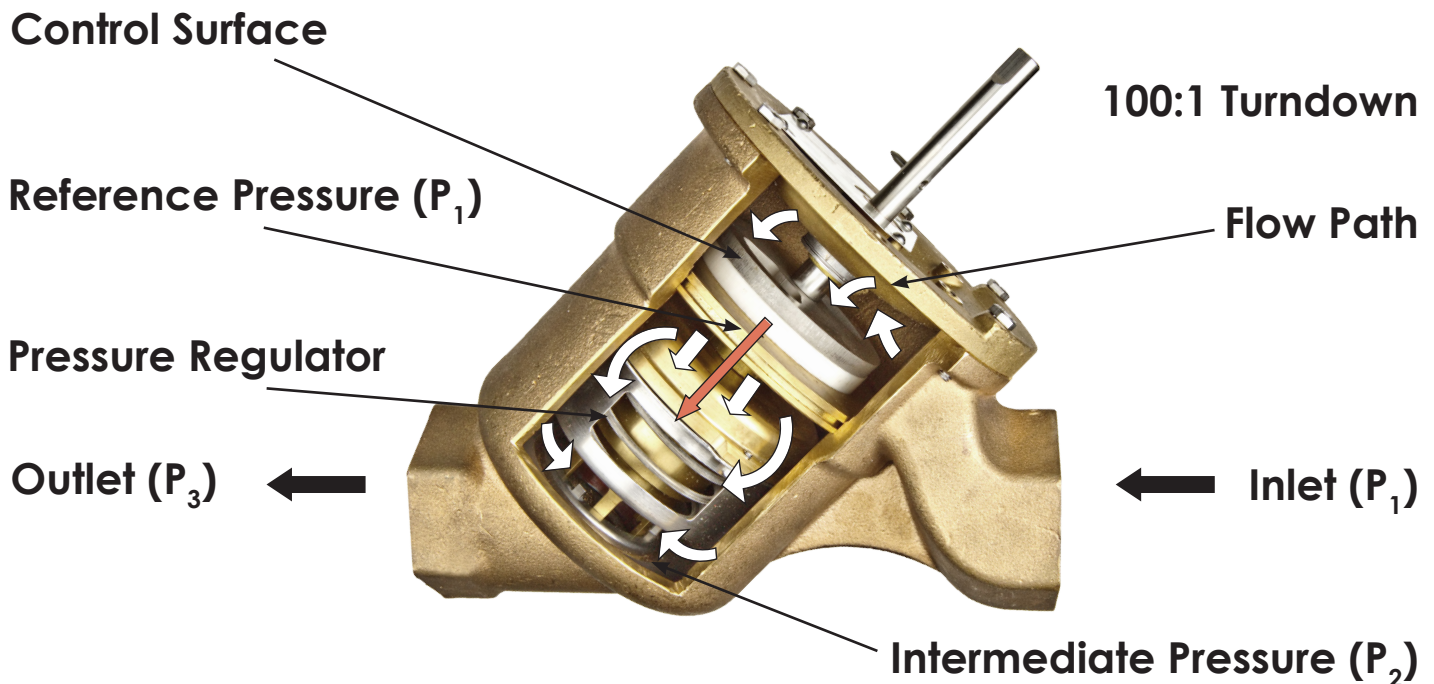
Precision Control DeltaP Valves



guaranteed delta T · [www.flowcontrol.com](http://www.flowcontrol.com) · 10-year warranty · [www.flowcontrol.com](http://www.flowcontrol.com) · made in the USA



# A Fundamentally Different Control Valve



## Save Energy

- ✓ Use less flow for heating and cooling
- ✓ Run less equipment in the central plant
- ✓ Enable condensing boilers to condense
- ✓ Minimize simultaneous heating and cooling

## Guarantee Available Capacity

- ✓ Serve more space with existing systems
- ✓ Reduce pump and piping constraints
- ✓ Extend thermal storage capability

## Lower System Costs

- ✓ Simplify system design and control
- ✓ Design with fewer pumps and smaller pipes
- ✓ Ensure greater system diversity
- ✓ Reduce maintenance and eliminate hydronic balancing

## Improve Comfort

- ✓ Tighten control
- ✓ Achieve precise response
- ✓ Stabilize LAT
- ✓ Reduce hot and cold calls

SALES ORDER 12345 SERIAL NO. 3-54321 MODEL NO. 3" HDP-126-5	
DEGREES OPEN	Design 122 GPM
0	0.0
10	1
20	19
30	39
40	58
50	77
60	96
70	114
80	131
90	134
TAG: AHU-1 (Sample Flow)	

**DeltaPValves are factory tested and tagged to display the actual flow in operation.**

# What Sets Us Apart

## 10-Year Warranty

In 2015, we extended our warranty to 10 years for all ½" - 8" valves - at least twice the current standard warranty coverage of any competitor. Designed to last the life of your piping system, the DeltaP-Valve® is guaranteed to offer many years of reliable precision control.

## Delta T (ΔT) Guarantee

The only control valve manufacturer to guarantee delta T performance, or the valves are free.

## Factory Commissioned

All DeltaPValves are flow tested with performance verified before shipment. Each valve has a unique serial number, and all testing data tied to that valve is maintained in the FCI database.

## Flow Tags

Factory certified flow tag states the actual flow at 10 degree increments from real test data for each valve.

## Field Verifiable Flow

Three P/T ports allow field verification of flow and pressure independence on all valves.

## Pressure Independent

DeltaPValves instantaneously compensate for system pressure fluctuations to maintain stable flow at all valve positions.

## Turndown

All DeltaPValves are industrial quality, capable of more than 100:1 turndown from maximum valve flow.

## Operating Pressure Range

DeltaPValves provide pressure independent control over a wide range of operating pressures (5 to 70 and 10 to 90 PSID) [0.34 to 4.83 and 0.69 to 6.20 bar].

## Shutoff

Class IV on valves 2" and below. Class III on 3" and above. Typical shutoff for cooling and heating systems is Class III or better.

## Pressure/Temperature Ports

Three P/T ports standard to reduce installation cost, simplify troubleshooting, and allow for flow and pressure independence verification.

## Experience

Originator of PICVs for the HVAC industry. More than 25 years experience and leadership in design, application, and manufacturing.

## Complete Valve Size Range

½" - 16" valve sizes provide accurate pressure-independent control of flow up to 5500 GPM (347.0 LPS).

## Lowest Total Cost of Ownership

Allows for the reduction of first cost, operating cost, and deferred capital investment in cooling and heating systems.

## Debris Resistant Design

Designed with large openings, springs, and surface areas to resist clogging and maintain pressure independence.

## Serviceable

DeltaPValves are field serviceable, setting them apart from other PICV products in the market today.

## Made in the USA

100% American-made DeltaPValves are available for projects meeting the requirements of the American Recovery and Reinvestment Act of 2009.

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Delta T (the difference between supply and return water temperatures) is an important measure of total performance in heating and cooling distribution systems. The DeltaPValve® matches water side to air side load to minimize water flow.

$$\Delta T = \frac{24 \times \text{Tons}}{\text{GPM}}$$

$$\Delta T = \frac{\text{BTUH}}{500 \times \text{GPM}}$$

## Low $\Delta T$ Syndrome

- Typical hydronic systems aren't able to maintain precision control to achieve design or better delta T.
- Variable operating conditions, pressure fluctuations, and improper equipment selection all contribute to increased flow rates and low delta T.
- Flow-limited systems fail to deliver the full installed capacity.

### Symptoms of Low $\Delta T$ :

- Running additional equipment
- Blending return water with supply
- Higher supply fan speeds
- Insufficient system pressure at remote air handlers

### Results of Low $\Delta T$ :

- Wasted energy and money
- Stranded heating and cooling capacity
- Loss of comfort control
- Unnecessary system complexity
- Quick depletion of thermal energy storage
- Simultaneous heating and cooling

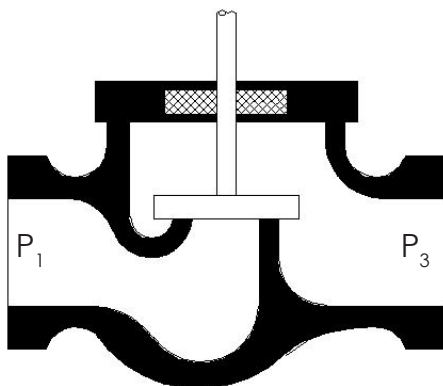
## A System Solution

Precise flow control at chilled and heating water coils is the only way to achieve the system stability required to maximize installed production and distribution infrastructure while minimizing system energy consumption.

# Your Control Decision

## Conventional Control

### Conventional Valve

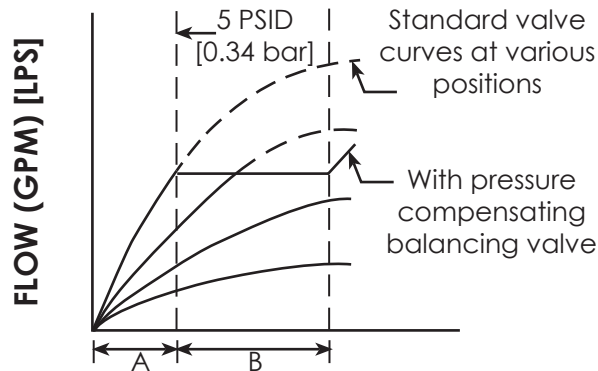


$$Q = C_v \times \sqrt{\Delta P}$$

( $\Delta P$  Varies)

The  $\Delta P$  ( $P_1 - P_3$ ) across a conventional valve changes with system pressure fluctuations. Coil flow will vary regardless of changes in load.

### Flow Performance

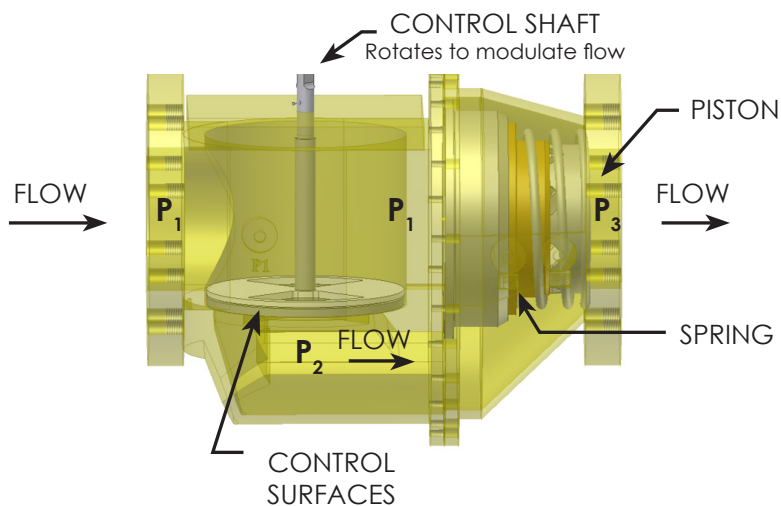


### $\Delta P$ ACROSS VALVE

In pressure ranges A and B, the control valve flow varies with  $\Delta P$  across the valve. In pressure range B, the pressure compensating balancing valve only limits the maximum flow through the coil.

## Precision Control

### DeltaPValve®

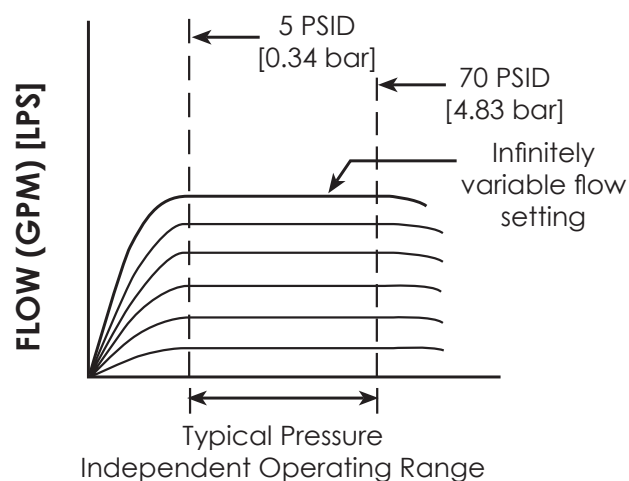


$$Q = C_v \times \sqrt{\Delta P}$$

( $\Delta P$  Constant)

The  $\Delta P$  across the control surface ( $P_1 - P_2$ ) in a DeltaPValve® remains low and constant despite system pressure fluctuations. Coil flow only varies when the actuator rotates the control shaft to accommodate changes in load.

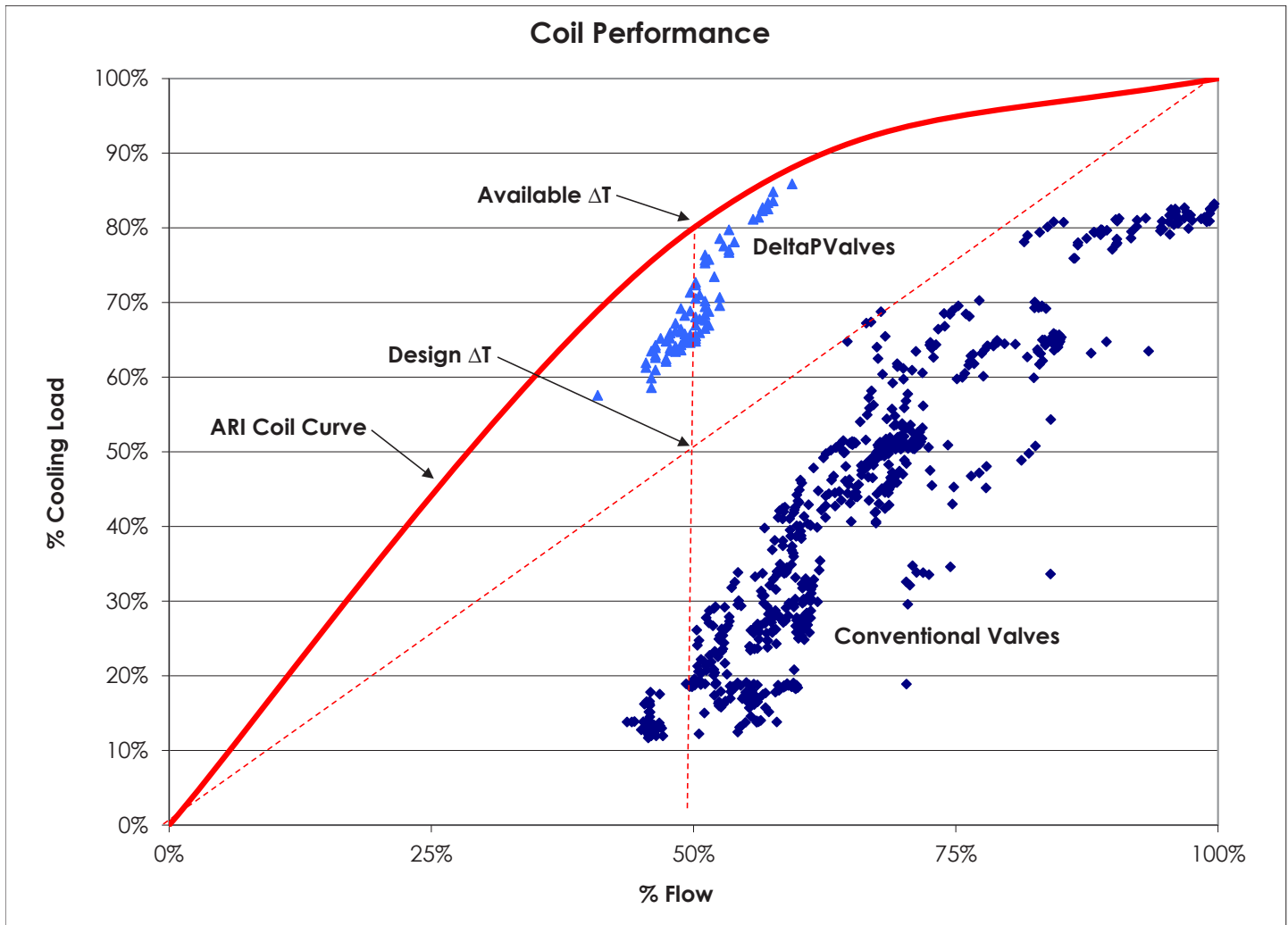
### Flow Performance



### $\Delta P$ ACROSS VALVE

As the minimum  $\Delta P$  across a DeltaPValve® is reached, flow remains stable and constant at any setting.

# Coil Performance

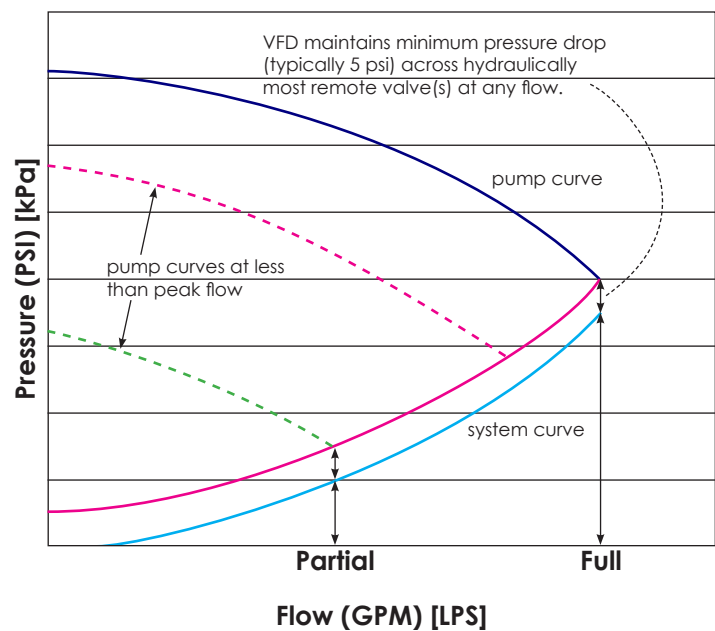


## Variable Speed Pumping System

DeltaP Valves, combined with variable speed pumping, will optimize system performance and minimize energy consumption. Variable speed drives are recommended when loads vary and pumps can operate below full-rated flow.

Conventional piping systems see wide pressure fluctuations, even with variable speed pumps and complex controls. This causes system instability, resulting in low delta T and limiting the benefits of the drives. DeltaP Valves stabilize system flow and increase delta T at each heating and cooling coil.

## Variable Speed Pumping System





# The DeltaPValve® Application

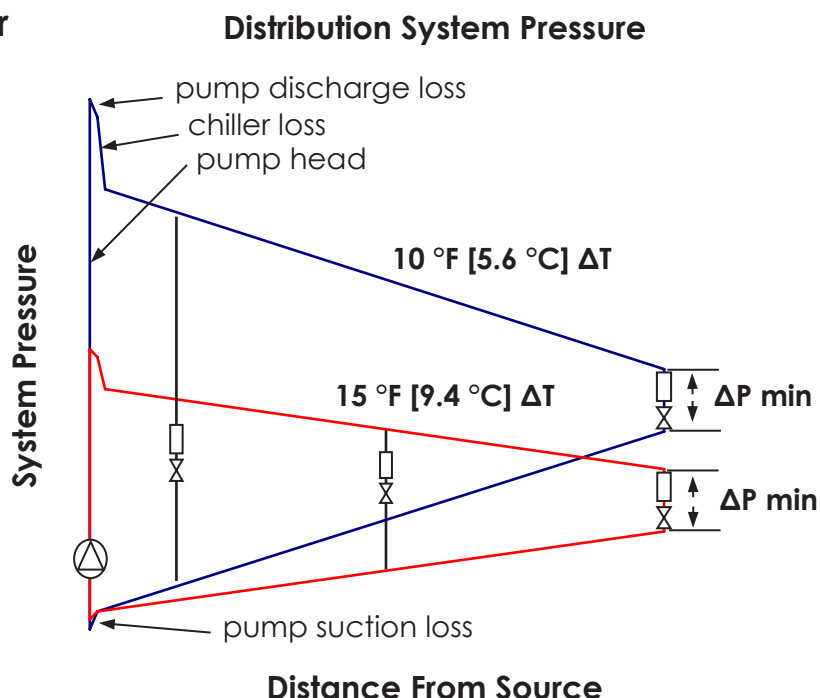
## Achieve High $\Delta T$ to Minimize Energy

### 1/2 Flow = 1/4 Head = 1/8 Power

(80% capacity)

The key to reducing pump energy consumption is achieving high delta T and minimizing flow while still serving the heating or cooling load.

Reducing the flow required at building coils significantly reduces the necessary pump head and brake horsepower.



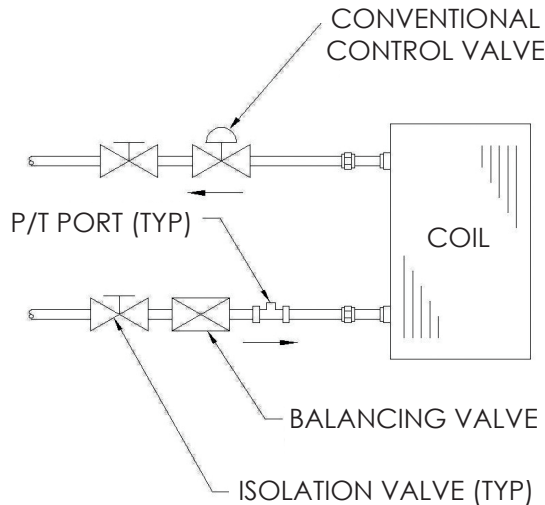
## More Capacity. Less Capital.

Achieving high delta T allows existing production and distribution systems to serve larger loads. This reduces pumping and piping constraints, extends thermal storage hours and helps realize full plant capacity.

Capacity Limit	Delta T °F [°C]	Available Capacity	Comment
Chiller plant 12°F $\Delta T$ design [6.7°C $\Delta T$ design]	10 [5.6]	83%	Chiller plant becomes flow limited at peak loads with low delta T
	12 [6.7]	100%	
	15 [8.3]	100%	
Thermal Storage 480K gal., 12°F $\Delta T$ design [1,817 m <sup>3</sup> , 6.7°C $\Delta T$ design]	10 [5.6]	83%	TES capacity can be proportionally increased with higher delta T
	12 [6.7]	100%	
	15 [8.3]	125%	
Distribution Pipe 10", 2,000 GPM, 8 fps [254 mm, 126 L/S, 2.4 mps]	10 [5.6]	80%	Pipe capacity can be proportionally increased with higher delta T
	12 [6.7]	100%	
	15 [8.3]	125%	

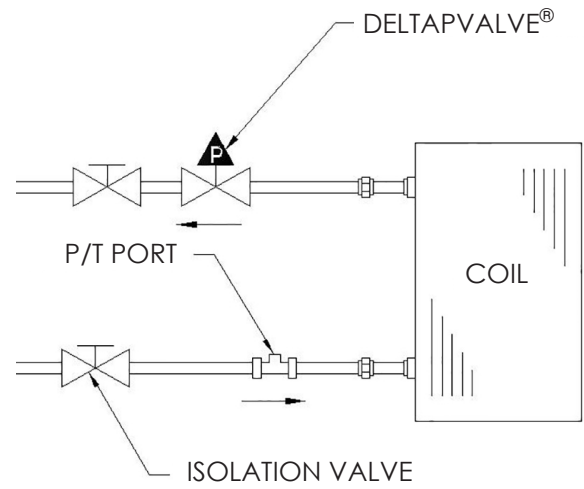


## Simplify Piping and Building Connections



**Conventional Control Valve**

1. Flow will vary through the coil as system pressure changes.
2. Typical valve sizing practice results in poorly sized control valves throughout the system.
3. Balancing valves limit flow and add to the system pressure drop.

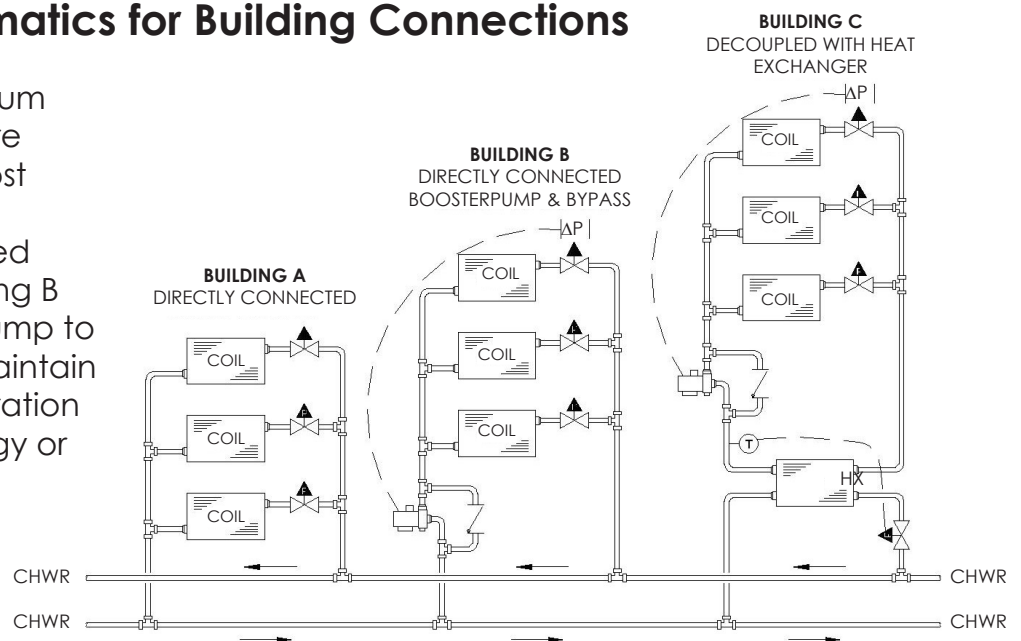


**DeltaP Valve®**

1. Flow through the coil remains constant, independent of system pressure changes.
2. DeltaP Valves are sized by maximum flow rate only.
3. No balancing valves are required, even as the system changes or expands.

## Typical Piping Schematics for Building Connections

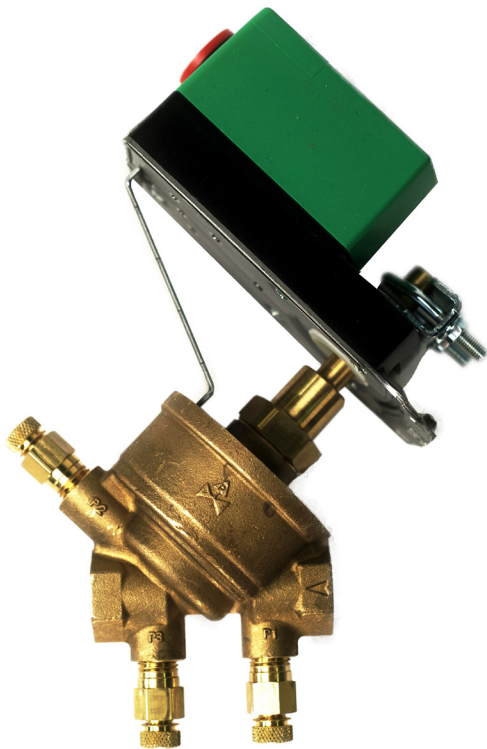
Always maintain the minimum required differential pressure across the hydraulically most remote valve. Building A configuration is the preferred piping arrangement. Building B configuration allows the pump to run only as necessary to maintain delta P. Building C configuration is common for district energy or large campus facilities (not recommended for new installation).



# DeltaPValve® Series

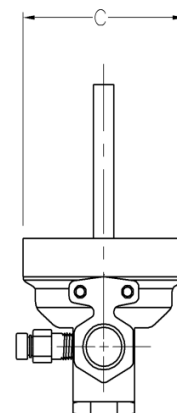
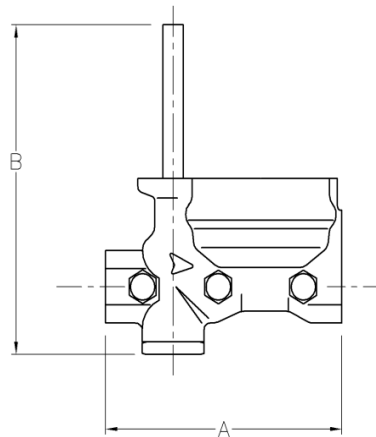
## ½" LDP DeltaPValve®

• Guaranteed  $\Delta T$  •



### Valve Specifications

<b>Characteristics</b>	Pressure Independent
<b>Service</b>	Heating Water or Chilled Water, Glycol
<b>Maximum Design Flow at 5 PSID [0.34 bar] Minimum</b>	2.0 GPM [0.13 LPS]
<b>Maximum Flow Variation</b>	+/- 5%
<b>Differential Pressure Range</b>	5-40 PSID [0.34 – 2.76 bar]
<b>Body Pressure Rating</b>	300 PSIG [20.7 bar]
<b>Close Off Pressure</b>	200 PSID [13.8 bar]
<b>Pipe Connections</b>	Female NPT or Sweat
<b>Materials</b>	
<b>Body</b>	Brass
<b>Internals</b>	Brass / 304 SS
<b>Seals</b>	EPR / EPDM
<b>Shutoff</b>	ANSI B16-104
<b>Leakage</b>	ANSI / FCI 70-2-2-2006, Class IV
<b>Rangeability</b>	100:1
<b>Maximum Temperature</b>	250° F [121° C]
<b>P/T Ports</b>	3
<b>Weight (without actuator)</b>	2.24 lbs [1.02 kg]
<b>Actuation</b>	90° Electric Fail in Place



Dimensions in inches [mm]				
Valve Size	Valve Type	A	B	C
½" LDP [15 mm]	Threaded	3.0 [76]	5.6 [142]	2.7 [69]
½" LDP [15 mm]	Sweat	3.9 [99]	5.6 [142]	2.7 [69]
For information only and not for fabrication				

# DeltaPValve® Series

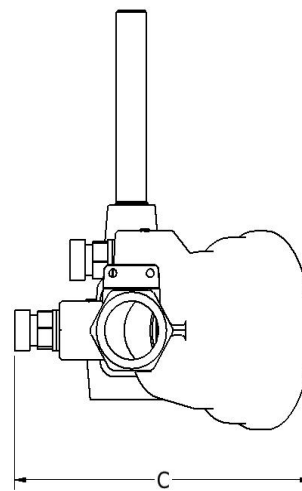
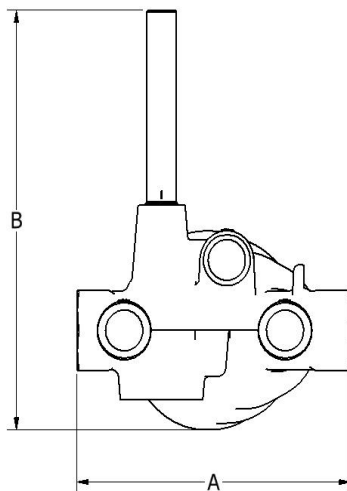
## ½" MDP DeltaPValve®

• Guaranteed  $\Delta T$  •



### Valve Specifications

<b>Characteristics</b>	Pressure Independent
<b>Service</b>	Heating Water or Chilled Water, Glycol
<b>Maximum Design Flow at 5 PSID [0.34 bar] Minimum</b>	5.0 GPM [0.32 LPS]
<b>Maximum Flow Variation</b>	+/- 5%
<b>Differential Pressure Range</b>	5-70 PSID [0.34 – 4.83 bar]
<b>Body Pressure Rating</b>	300 PSIG [20.7 bar]
<b>Close Off Pressure</b>	200 PSID [13.8 bar]
<b>Pipe Connections</b>	Female NPT
<b>Materials</b>	
<b>Body</b>	Brass
<b>Internals</b>	Brass / 304 SS
<b>Seals</b>	EPR / EPDM
<b>Shutoff</b>	ANSI B16-104
<b>Leakage</b>	ANSI / FCI 70-2-2-2006, Class IV
<b>Rangeability</b>	100:1
<b>Maximum Temperature</b>	250° F [121° C]
<b>P/T Ports</b>	3
<b>Weight (without actuator)</b>	1.67 lbs [0.76 kg]
<b>Actuation</b>	90° Electric Fail in Place, Fail Safe



Dimensions in inches [mm]				
Valve Size	Valve Type	A	B	C
½" MDP [15 mm]	Threaded	3.7 [94]	5.1 [130]	4.0 [101]
For information only and not for fabrication				

# DeltaPValve® Series

## 3/4" LDP & 1 1/4" LDP DeltaPValve®

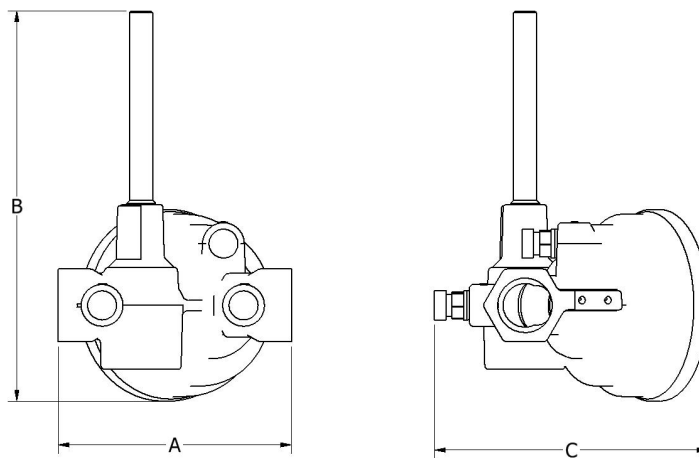
• Guaranteed  $\Delta T$  •



### Valve Specifications

<b>Characteristics</b>	Pressure Independent
<b>Service</b>	Heating Water or Chilled Water, Glycol
<b>Maximum Design Flow at 5 PSID [0.34 bar] Minimum</b>	3/4": 11.0 GPM [0.69 LPS] 1 1/4": 32.0 GPM [2.00 LPS]
<b>Maximum Flow Variation</b>	+/- 5%
<b>Differential Pressure Range</b>	5-70 PSID [0.34 – 4.83 bar]
<b>Body Pressure Rating</b>	300 PSIG [20.7]
<b>Close Off Pressure</b>	200 PSID [13.8]
<b>Pipe Connections</b>	Female NPT
<b>Materials</b>	
<b>Body</b>	Brass
<b>Internals</b>	Brass / 304 SS
<b>Seals</b>	EPR / EPDM
<b>Shutoff</b>	ANSI B16-104
<b>Leakage</b>	ANSI / FCI 70-2-2-2006, Class IV
<b>Rangeability</b>	100:1
<b>Maximum Temperature</b>	250° F [121° C]
<b>P/T Ports</b>	3
<b>Weight (without actuator)</b>	3/4": 3.19 lbs [1.45 kg] 1 1/4": 5.5 lbs [2.50 kg]
<b>Actuation</b>	90° Electric, Manual*

\*Pneumatic is available on our 3/4" HDP and 1 1/4" HDP. Contact Factory for information.



Dimensions in inches [mm]			
Valve Size	A	B	C
3/4" LDP [20 mm]	4.0 [101]	6.7 [170]	4.7 [120]
1-1/4" LDP [32 mm]	6.0 [152]	7.7 [178]	5.6 [142]
For information only and not for fabrication			

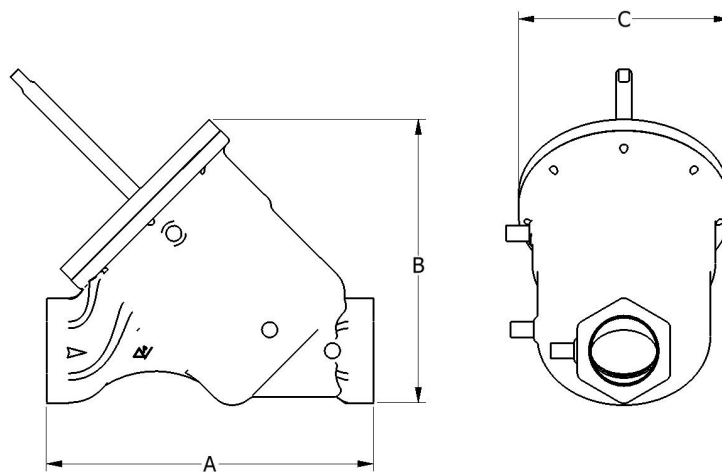
## 2" HDP DeltaPValve®

• Guaranteed  $\Delta T$  •



### Valve Specifications

<b>Characteristics</b>	Pressure Independent
<b>Service</b>	Heating Water or Chilled Water, Glycol
<b>Maximum Design Flow at 5 PSID [0.34 bar] Minimum</b>	90 GPM [5.7 LPS]
<b>Maximum Design Flow at 10 PSID [0.69 bar] Minimum</b>	112 GPM [7.1 LPS]
<b>Maximum Flow Variation</b>	+/- 5%
<b>Differential Pressure Range</b>	5-70 PSID [0.34 – 4.83 bar] 10-90 PSID [0.69 – 6.20 bar]
<b>Body Pressure Rating</b>	300 PSIG [20.7]
<b>Close Off Pressure</b>	200 PSID [13.8]
<b>Pipe Connections</b>	Female NPT
<b>Materials</b>	
<b>Body</b>	Brass
<b>Internals</b>	Brass / 304 SS
<b>Seals</b>	EPR / EPDM
<b>Shutoff</b>	ANSI B16-104
<b>Leakage</b>	ANSI / FCI 70-2-2-2006, Class IV
<b>Rangeability</b>	100:1
<b>Maximum Temperature</b>	250° F [121° C]
<b>P/T Ports</b>	3
<b>Weight (without actuator)</b>	34 lbs [15.4 kg]
<b>Actuation</b>	90° Electric, Pneumatic, Manual



Dimensions in inches [mm]			
Valve Size	A	B	C
2" HDP [50 mm]	10.5 [267]	9.4 [239]	6.8 [173]
For information only and not for fabrication			

# DeltaPValve® Series

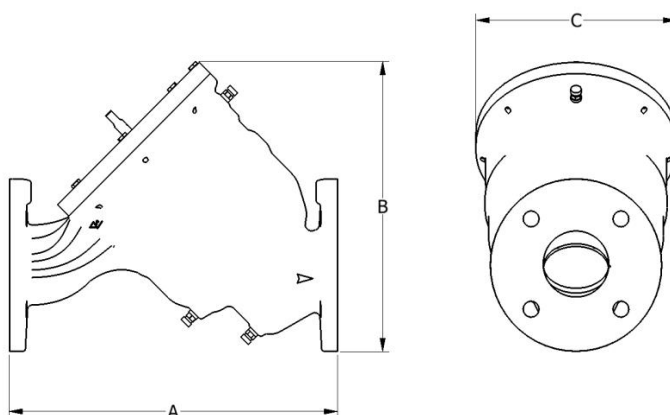
## 3" HDP DeltaPValve®

• Guaranteed  $\Delta T$  •



### Valve Specifications

<b>Characteristics</b>	Pressure Independent
<b>Service</b>	Heating Water or Chilled Water, Glycol
<b>Maximum Design Flow at 5 PSID [0.34 bar] Minimum</b>	180 GPM [11.4 LPS]
<b>Maximum Design Flow at 10 PSID [0.69 bar] Minimum</b>	209 GPM [13.2 LPS]
<b>Maximum Flow Variation</b>	+/- 5%
<b>Differential Pressure Range</b>	5-70 PSID [0.34 – 4.83 bar] 10-90 PSID [0.69 – 6.20 bar]
<b>Body Pressure Rating</b>	150 PSIG [10.3 bar] 300 PSIG [20.7 bar]
<b>Close Off Pressure</b>	150 PSID [10.3 bar]
<b>Pipe Connections</b>	ANSI 125# FF Flanged (150 PSIG) [10.3 bar] ANSI 250# FF Flanged (300 PSIG) [20.7 bar]
<b>Materials</b>	
<b>Body</b>	Ductile Iron
<b>Internals</b>	Brass / Teflon / CS / 304 SS
<b>Seals</b>	EPR / EPDM
<b>Shutoff</b>	ANSI B16-104
<b>Leakage</b>	ANSI / FCI 70-2-2-2006, Class III
<b>Rangeability</b>	100:1
<b>Maximum Temperature</b>	250° F [121° C]
<b>P/T Ports</b>	3
<b>Weight (without actuator)</b>	112 lbs [50.8 kg]
<b>Actuation</b>	90° Electric, Pneumatic, Manual

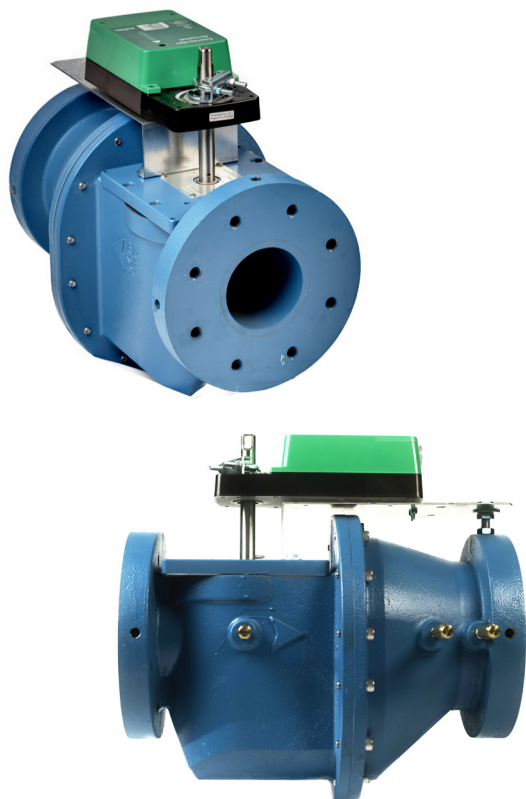


Dimensions in inches [mm]			
Valve Size	A	B	C
3" HDP [80 mm]	15.5 [394]	13.6 [345]	9.5 [241]
For information only and not for fabrication			



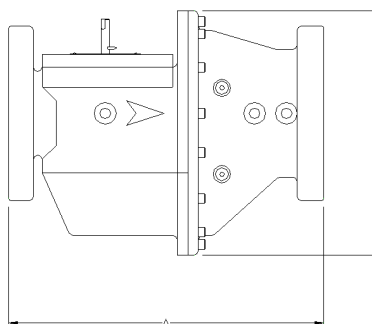
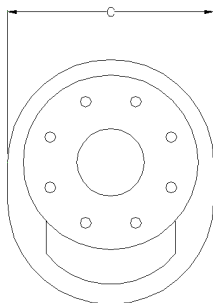
## 4" EDP & 6" EDP DeltaPValve®

• Guaranteed  $\Delta T$  •



### Valve Specifications

<b>Characteristics</b>	Pressure Independent
<b>Service</b>	Heating Water or Chilled Water, Glycol
<b>Maximum Design Flow at 5 PSID [0.34 bar] Minimum</b>	4": 326 GPM [20.6 LPS] 6": 650 GPM [41.0 LPS]
<b>Maximum Design Flow at 10 PSID [0.69 bar] Minimum</b>	4": 430 GPM [27.1 LPS] 6": 800 GPM [50.5 LPS]
<b>Maximum Flow Variation</b>	+/- 5%
<b>Differential Pressure Range</b>	5-70 PSID [0.34 – 4.83 bar] 10-90 PSID [0.69 – 6.20 bar]
<b>Body Pressure Rating</b>	150 PSIG [10.3 bar] 300 PSIG [20.7 bar]
<b>Close Off Pressure</b>	150 PSID [10.3 bar]
<b>Pipe Connections</b>	ANSI 125# FF Flanged (150 PSIG) [10.3 bar] ANSI 250# FF Flanged (300 PSIG) [20.7 bar]
<b>Materials</b>	
<b>Body</b>	Ductile Iron
<b>Internals</b>	Brass / Teflon / CS / 304 SS
<b>Seals</b>	EPR / EPDM
<b>Shutoff</b>	ANSI B16-104
<b>Leakage</b>	ANSI / FCI 70-2-2-2006, Class III
<b>Rangeability</b>	100:1
<b>Maximum Temperature</b>	250° F [121° C]
<b>P/T Ports</b>	3
<b>Weight (without actuator)</b>	4": 165 lbs [75 kg] 6": 240 lbs [109 kg]
<b>Actuation</b>	90° Electric, Pneumatic, Manual



Dimensions in inches [mm]			
Valve Size	A	B	C
4" EDP [100 mm]	18.0 [457]	14.0 [356]	11.8 [298]
6" EDP [150 mm]	20.5 [521]	16.2 [413]	13.4 [340]
For information only and not for fabrication			



# DeltaPValve® Series

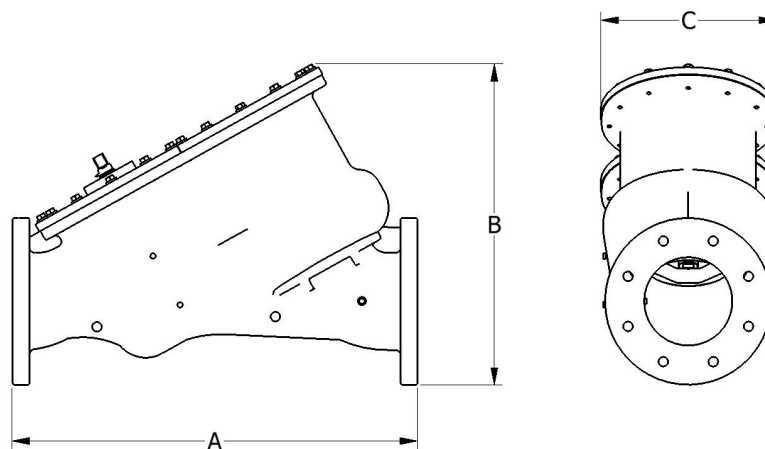
## 8" IDP DeltaPValve®

• Guaranteed  $\Delta T$  •



### Valve Specifications

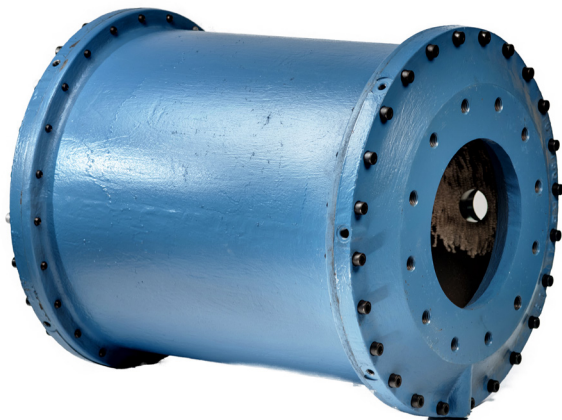
<b>Characteristics</b>	Pressure Independent
<b>Service</b>	Heating Water or Chilled Water, Glycol
<b>Maximum Design Flow at 5 PSID [0.34 bar] Minimum</b>	1320 GPM [83 LPS]
<b>Maximum Design Flow at 10 PSID [0.69 bar] Minimum</b>	1750 GPM [110 LPS]
<b>Maximum Flow Variation</b>	+/- 5%
<b>Differential Pressure Range</b>	5-70 PSID [0.34 – 4.83 bar] 10-90 PSID [0.69 – 6.20 bar]
<b>Body Pressure Rating</b>	150 PSIG [10.3 bar] 300 PSIG [20.7 bar]
<b>Close Off Pressure</b>	150 PSID [10.3 bar]
<b>Pipe Connections</b>	ANSI 125# FF Flanged (150 PSIG) [10.3 bar] ANSI 250# FF Flanged (300 PSIG) [20.7 bar]
<b>Materials</b>	
<b>Body</b>	Ductile Iron
<b>Internals</b>	Brass / Teflon / CS / 304 SS
<b>Seals</b>	EPR / EPDM
<b>Shutoff</b>	ANSI B16-104
<b>Leakage</b>	ANSI / FCI 70-2-2-2006, Class III
<b>Rangeability</b>	100:1
<b>Maximum Temperature</b>	250° F [121° C]
<b>P/T Ports</b>	3
<b>Weight (without actuator)</b>	575 lbs [261 kg]
<b>Actuation</b>	90° Electric, Pneumatic, Manual



Dimensions in inches [mm]			
Valve Size	A	B	C
8" IDP [200 mm]	36.5 [926]	28.8 [732]	15.8 [401]
For information only and not for fabrication			

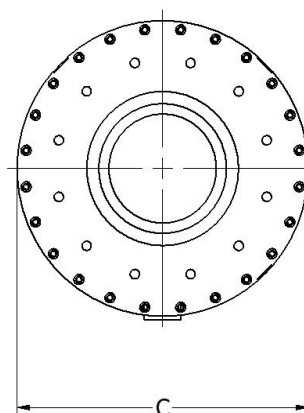
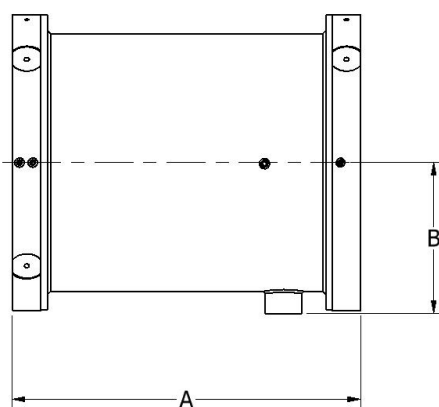
# Large DeltaP Valve® Series

## 10", 12", 14", & 16" KDP DeltaP Valve®



### Valve Specifications

<b>Characteristics</b>	Pressure Independent
<b>Service</b>	Heating Water or Chilled Water, Glycol
<b>Maximum Design Flow at 5 PSID [0.34 bar] Minimum</b>	10": 2200 GPM [139 LPS] 12": 3000 GPM [189 LPS] 14": 4400 GPM [278 LPS] 16": 5500 GPM [347 LPS]
<b>Maximum Flow Variation</b>	+/- 5%
<b>Differential Pressure Range</b>	5-70 PSID [0.34 – 4.83 bar]
<b>Body Pressure Rating</b>	150 PSIG [10.3 bar] 300 PSIG [20.7 bar]
<b>Close Off Pressure</b>	Contact Factory
<b>Pipe Connections</b>	ANSI 125# FF Flanged (150 PSIG) [10.3 bar] ANSI 250# FF Flanged (300 PSIG) [20.7 bar]
<b>Materials</b>	
<b>Body</b>	Carbon Steel, Stainless Steel
<b>Internals</b>	Brass / Ductile Iron / 304 SS
<b>Seals</b>	EPDM / Nitrile
<b>Shutoff</b>	ANSI B16-104
<b>Leakage</b>	ANSI / FCI 70-2-2-2006, Class III
<b>Rangeability</b>	100:1
<b>Maximum Temperature</b>	130° F [54° C]
<b>P/T Ports</b>	3
<b>Weight (without actuator)</b>	10" & 12": 1050 lbs [476.2 kg] 14" & 16": 2400 lbs [1089 kg]
<b>Actuation</b>	Factory Supplied Hydraulic



Dimensions in inches [mm]			
Valve Size	A	B	C
10" KDP [250 mm]	27.5 [698]	11.8 [300]	23 [584]
12" KDP [300 mm]	27.5 [698]	11.8 [300]	23 [584]
14" KDP [350 mm]	32 [813]	18.5 [470]	37 [940]
16" KDP [400 mm]	32 [813]	18.5 [470]	37 [940]
For information only and not for fabrication			

## Section 15000; Modulating Control Valves

- A. All modulating control valves shall be pressure independent and provided by the same manufacturer. The basis of design is the DeltaPValve® as manufactured by:

Flow Control Industries, Inc.	P: (866) 454-1288
PO Box 848	F: (425) 486-5672
Woodinville, WA 98072	<a href="http://www.flowcontrol.com">www.flowcontrol.com</a>

- B. All modulating control valves shall be industrial quality and must be fully field-rebuildable. Valves shall be designed to last 100,000+ on/off cycles.
- C. Each control valve shall be individually factory flow tested and calibrated to deviate by no more than  $\pm 5\%$  through the entire operating differential pressure range without the use of additional electronics. All valves shall be tested on a test stand calibrated and verified with traceability to NIST standards.
- D. The control valve operating differential pressure range shall be 5 to 70 or 10-90 PSID [0.34 to 4.83 or 0.69 to 6.2 bar], and shall be equal to or greater than the associated pump's design head pressure.
- E. Each control valve shall have a calibrated performance tag listing the measured flow rate in rotation increments of 10 degrees through full stroke. Multi-turn actuators are not acceptable.
- F. Control valves shall be factory set not-to-exceed the coil design flow rate.
- G. Balancing labor, balancing valves and flow limiting devices are not required.
- H. Valve bodies 2" [50mm] and smaller shall be brass. Valve bodies 3" [80mm] and larger shall be ductile iron. Internal control surfaces and pressure regulator components shall be brass, stainless steel, carbon steel, EPDM or Teflon®.
- I. All control valves shall have three (3) factory-installed Pressure/Temperature ports to allow factory and field verification of flow and proper operation. These ports shall be located at the inlet, intermediate, and outlet locations of the valve. The intermediate port must be located between the control surface and pressure regulator.
- J. Control valve flow characteristics shall be field-modifiable, and may be modified inline.
- K. Control valves shall be warranted by the manufacturer for a full 10 years from the date of purchase. The warranty provided by the actuator manufacturer shall apply to actuators.
- L. The control valve manufacturer guarantees that the heating and cooling coils will meet or exceed design delta T performance at all load conditions as projected by an AHRI certified coil program at time of commissioning, or the valves are free.

# Large DeltaPValve® Series Sample Spec

## Section 15000; Modulating Control Valves

- A. Provide a modulating, 2-way control valve with integrated hydraulic actuator to allow modulation from maximum flow to shut off.
- B. All modulating control valves shall be pressure independent and provided by the same manufacturer. The basis of design is the DeltaPValve® as manufactured by:
  - Flow Control Industries, Inc.    P: (866) 454-1288
  - PO Box 848    F: (425) 486-5672
  - Woodinville, WA 98072    www.flowcontrol.com
- C. Valve shall require no more than 5 PSID [0.34 bar] to operate pressure independently. Flow shall not vary more than +/-5% through the entire operating pressure range of 5 to 70 PSID [0.34 to 4.83 bar].
- D. Each control valve shall be individually flow tested and factory verified to deviate no more than +/-5% through the entire operating pressure range of 5 to 70 PSID [0.34 to 4.83 bar]. All valves shall be tested on a test stand calibrated and verified with traceability to NIST standards. All testing must be performed at 5 PSID [0.34 bar] (0 to 100% opening in 10% increments), 15 and 70 PSID [1.03 to 4.83 bar] (50% and 100%).
- E. Valve bodies shall be carbon steel or cast ductile iron. All internal parts shall be brass, carbon steel, and 304 stainless steel. Inflatable, internal expanding seal shall be EPDM.
- F. Valves must be provided with an integrated hydraulic actuator. Actuator must be by same manufacturer and be factory tested as a complete assembly with the control valve assembly.
- G.. Hydraulic actuator must be capable of responding to a 0-10 VDC, 2-10 VDC, or 4-20 mA signal, or via a 3-point floating 24V input signal.
- H. Fail positions on power failure must include in-place, open or closed.
- I. Hydraulic actuator must include a front display panel to allow access to the controls. Controls must also be accessible via a serial communications connection (Modbus RTU). The following information must be provided through the panel or via the serial communication:
  - a. On/Off/Remote/Local status
  - b. % Open
  - c. Valve differential pressure (P1-P3)
  - d. Intermediate pressure (P1-P2)
  - e. Target position
- J. Initial installation process must include an auto purging, self-calibrating function to simplify setup.
- K. Valves shall have (3) factory installed pressure/temperature ports to allow field verification of flow and pressure independent operation.
- L. Valve assembly and hydraulic actuator shall be warranted to be free of defects in material and workmanship for 5 years from date of purchase.

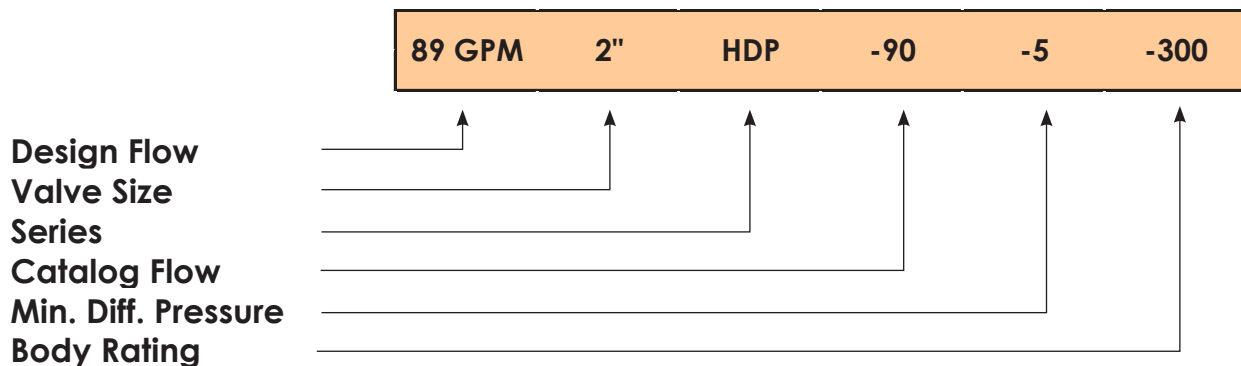
# The Valve Selection Process

## Valve Selection

- **Max Flow:** Determine the maximum flow rate (GPM) required (usually design from coil schedule).
- **Max  $\Delta P$ :** Determine the maximum differential pressure that the valve will work against (normally the design head of the pump serving that circuit).
- **Body Pressure:** Determine the maximum static pressure the valve will encounter to establish the required body pressure rating (150 or 300 psi) [10.3 bar or 20.7 bar].
- **Size Valve:** Based on the flow rate, determine the size and model number of the valve.
- **Flow Tag:** Determine coil tag description (i.e. CV-AHU-1, CV-FCU-3) for the valve tag.

## Sample Schedule

Valve Tag	Design GPM	Size	Series	Max	DP	Body	Shutoff	Actuator Brand	Model	Control Signal	Fail Action	Normal Position
VAV-1-15	3.8	0.5"	MDP	4	5	300	70	DELTA VALVE	MEP-4002	2-10 VDC	Fail-In-Place	N.C.
AHU-1 HW	145	3"	HDP	150	5	150	70	DELTA VALVE	MEP-7852	2-10 VDC	Fail-Safe	N.O.
AHU-1 CHW	375	6"	EDP	400	5	150	70	Keystone	E013ALW5000	2-10 VDC	Fail-In-Place	N.C.
AHU-2 HW	87	2"	HDP	90	5	300	70	DELTA VALVE	MEP-7552	2-10 VDC	Fail-Safe	N.O.
AHU-2 CHW	225	4"	EDP	248	5	150	70	DELTA VALVE	MEP-7802	2-10 VDC	Fail-In-Place	N.C.



<b>Valve Size:</b>	½" - 16" [15mm - 400mm]
<b>Series:</b>	LDP, MDP, FDP, HDP, EDP, IDP, KDP
<b>Catalog Flow:</b>	Maximum flow for selected valve components
<b>Minimum DP:</b>	5 PSID [0.34 bar] 10 PSID [0.69 bar]
<b>Body Rating:</b>	150 PSIG [10.3 bar] 300 PSIG [20.6 bar]

# Choosing the Right Actuator

## Actuator Selection

- **Actuator Type:** Determine what type of actuator you require. Electronic or pneumatic are available. All valves take a 0 to 90 degree rotating actuator. Electric actuators are recommended.
- **Size Actuator:** Using the torque table, size the actuator for the required shutoff pressure.
- **Fail Position:** Determine if you want fail safe operation. Standard modulating (proportional) electric actuators are recommended for all chilled water applications.
- **Fail Action:** Determine the action (normally open or normally closed) for all actuators and the fail position (open or closed) for pneumatic and electronic fail safe actuators.
- **Control Signal:** Choose the control signal for the actuators. Typically 2-10 VDC, 0-10 VDC, and 4-20 mA for electronic control and 8-13 psi for pneumatic control.
- **Accessories:** Determine if NEMA 4, P/T plug extensions, or any other special requests are desired.

## Electric or Pneumatic

One of the advantages in the design of DeltaPValves is its flexibility and compatibility with a range of actuators from major manufacturers, both electric and pneumatic. FCI recommends using electric actuators as opposed to pneumatic on DeltaPValves. The reasons are threefold; controllability, reliability, and availability.

DeltaPValves offer a precise level of control when paired with an actuator with high controllability. Electric actuators typically offer more discrete steps of control. Their direct connection to the shaft also reduces hysteresis from multiple leverage points typical on pneumatic actuators. Secondly, a pneumatic control system has many potential points of failure. Conversely, electric actuators are not susceptible to leaks and compressor operation. The industry is standardizing on electric actuators, making it more difficult to obtain pneumatic actuators and service parts.

## Fail-In-Place, Fail-Open, or Fail-Closed

Due to freeze protection and critical/comfort concerns, it is sometimes the preference of the owner and designer to specify fail-safe actuators. This may not always apply to every valve in the system or every project. Specifying fail safe where not required can add significant additional expense to a project when fail-in-place actuators will satisfy the requirements.



# Frequently Asked Questions

## **What is “delta T” ( $\Delta T$ )?**

Delta T is the difference between entering and leaving water temperatures at a heating or cooling coil.

## **Why is delta T important?**

Systems that operate with a high delta T are more efficient. Systems operating with a low delta T require more flow, more running equipment and consume more energy.

## **How many existing systems achieve delta T of design or greater at any load conditions?**

With over 25 years of experience in system design and modification, Flow Control Industries estimates less than 1% of conventional operating systems achieve design delta T.

## **Why do I need DeltaPValves to achieve a high delta T?**

DeltaPValves deliver precision control over a wide operating rangewith turn-down exceeding 100:1. DeltaPValves precisely match flow to the heating or cooling load, resulting in a high delta T.

## **Will the required 5 PSID differential across the DeltaPValve® increase my pump energy consumption?**

No. The amount of pump energy consumed is a function of both head pressure and flow rate. Because DeltaPValves improve coil heat transfer and reduce the flow required to serve the load, pump energy consumption is minimized.

## **What is the expected life for DeltaP-Valves?**

DeltaPValves can be expected to last 20 - 30 years in typical systems. Internal components are high quality and should never need replacement.

## **Why should I use the DeltaPValve® over other pressure independent control valves?**

No other manufacturer approaches hydronic system optimization with the breadth of experience and system expertise of Flow Control Industries. DeltaPValve® systems have consistently increased system capacity and improved energy efficiency while simplifying installation and operation of hydronic systems.

## **Are DeltaPValves selected the same way as pressure dependent valves?**

No. Pressure dependent valves are selected using a Cv and pressure drop, often resulting in oversized, underperforming valves. DeltaPValves are sized only with the coil design flow rate, for simple selection in new designs and easy integration into existing systems.

## **Can I use my DeltaPValve® to indicate flow?**

Yes, it is possible to field verify flow on each DeltaPValve® using the three pressure/temperature posts (standard) and valve position. Every DeltaPValve® is factory tested and tagged with the actual flow rate in 10 degree increments of rotation. If you know the valve position and verify minimum pressure, you know the flow rate.



# Flow Table & Torque Requirements

DELTA VALVE		Max GPM [liters per second]				
Small Valve Series		5 to 40 PSID [0.34 to 2.75 bar]				
	½" LDP [15 mm]	0.5 [0.03]	1 [0.06]	1.5 [0.09]	2 [0.12]	
		5 to 70 PSID [0.34 to 4.83 bar]				
	½" MDP [15 mm]	1 [0.06]	2 [0.12]	3 [0.18]	4 [0.25]	5 [0.31]
	¾" LDP [20 mm]	6 [0.37]	8 [0.50]	11 [0.69]		10 to 90 PSID [0.69 to 6.20 bar]
	¾" HDP** [20 mm]	6 [0.37]	8 [0.50]	11 [0.69]		14 [0.88]
	1 ¼" LDP [32 mm]	18 [1.13]	24 [1.51]	32 [2.01]		
	1 ¼" HDP** [32 mm]	18 [1.13]	24 [1.51]	32 [2.01]		38 [2.39]
Medium Valve Series	2" HDP [50 mm]	52 [3.2]	75 [4.7]	90 [5.6]		112 [7.0]
	3" HDP [80 mm]	126 [7.9]	150 [9.4]	180 [11.3]		209 [13.1]
	4" EDP [100 mm]	248 [15.6]	308 [19.4]	326 [20.5]		430 [27.1]
	6" EDP [150 mm]	400 [25.2]	500 [31.5]	590 [37.2]	650 [41.0]	800 [50.4]
	8" IDP [200 mm]	700 [44.0]	900 [56.0]	1130 [71.0]	1320 [83.0]	1750 [110.0]
Large Valve Series	10" KDP [250 mm]	2200 [138.0]				
	12" KDP [300 mm]	3000 [189.0]				
	14" KDP [350 mm]	4400 [278.0]				
	16" KDP [400 mm]	5500 [347.0]				

Maximum flow rates are consistent throughout the listed differential pressure range.

\*Fail safe and pneumatic actuators

\*\*Contact factory for dimension information for pneumatic actuators or the 10 to 90 PSID [0.69 to 6.20 bar] option

## DeltaPValve® Torque Requirements in-lb [N-m]

Across Valve	DeltaPValve® Size & Model										
	½" LDP	½" MDP	¾" HDP	¾" LDP	1 ¼" HDP	1 ¼" LDP	2" HDP	3" HDP	4" EDP	6" EDP	8" IDP
At 70 psi shutoff	20 [2.3]	20 [2.3]	27 [3.1]	27 [3.1]	56 [6.3]	56 [6.3]	85 [9.6]	200 [23]	310 [35]	850 [96]	1400 [189]
At 90 psi shutoff	22 [2.5]	22 [2.5]	28 [3.2]	28 [3.2]	60 [6.8]	60 [6.8]	110 [13]	220 [25]	360 [41]	1050 [120]	1600 [181]
At 150 psi shutoff	24 [2.8]	24 [2.8]	31 [3.5]	31 [3.5]	66 [7.5]	66 [7.5]	130 [15]	350 [40]	530 [60]	1520 [172]	2110 [239]

Note: Valves are capable of close off against body static pressure rating. Valve actuator torque is selected to provide close off against valve differential pressure rating.



**P.O. Box 848  
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Woodinville, Washington 98072  
P: 866-454-1288 | F: 425-486-5672**

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