Control Valve

Erratic control. Costly maintenance. And a valve that "hunts" because it can't find its set point. They're familiar control valve problems. And the all-too-familiar solution? Overkill. Pay more than you should for a valve that does more than it needs to.

Too often, matching a valve to an application is a matter of taking what you can get to do the job – an oversized actuator, for instance. Instead of getting what you need. Inefficient? Of course, but until now it's also been unavoidable.

Accuracy and Control That's Not Overpriced… or Overkill

The Armstrong control valve gives you exactly what you need to apply the right valve to an application: flexibility. It fills the void left by expensive industrial valves that can't deliver the control you must have. Designed for steam and hot water service, the Armstrong valve is ideally suited to non-freezing applications in the 1/2" to 1 1/2" range: reheat coils, pipe coils, food dryers, meat smokers, corrugators, laundry and food processing equipment – to name a few.

The standard Armstrong control valve is reverse acting with a spring return. It uses air to open and fails closed (air to close available – consult factory). The valve meets the vast majority of typical control valve applications without sacrificing rangeability (minimum controllable flow).

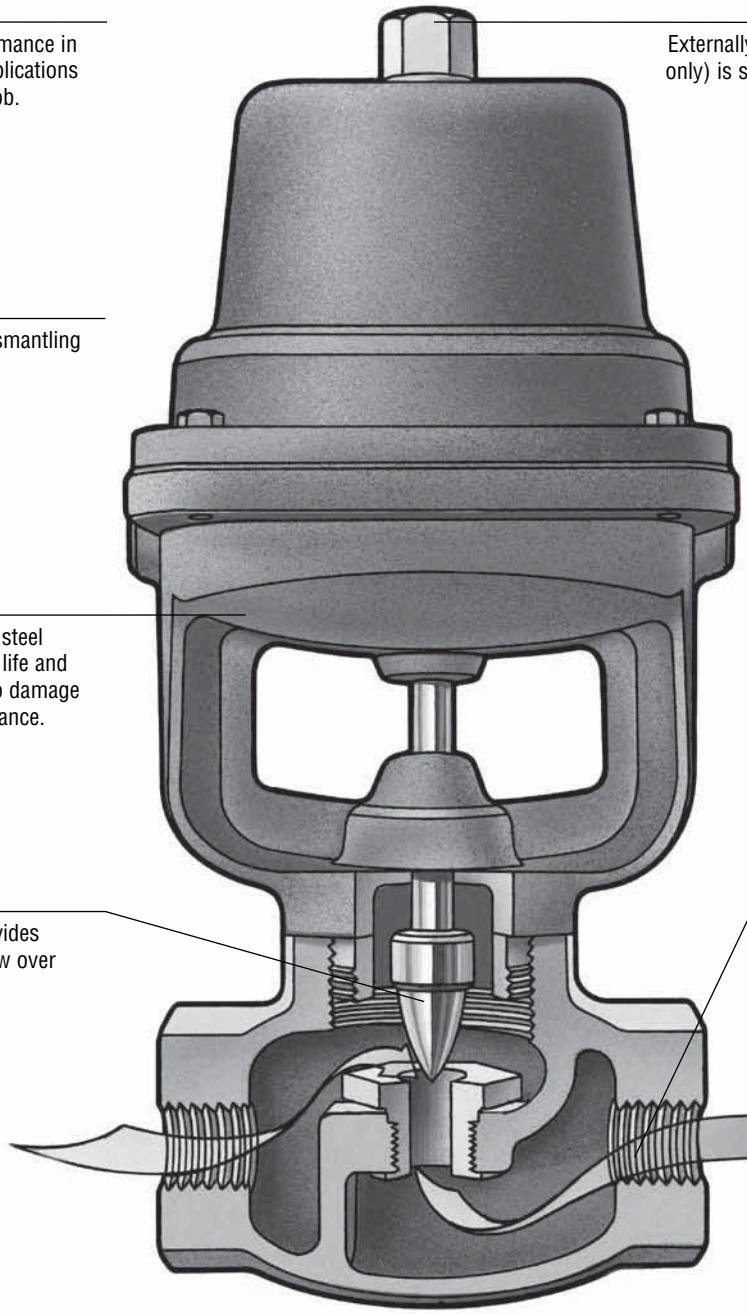
Note: For water service, the valve must be piped in reverse.

Years of successful performance in rigorous steam control applications ensures reliability on the job.

Externally adjustable start point (1/2" & 3/4" size only) is standard on pneumatic operator – saves operator time and effort.

Repairs quickly without dismantling the piping.

Dacron-reinforced silicone diaphragm is fatigue and temperature resistant.



All trim parts are stainless steel or brass. That means long life and reliability – no corrosion to damage the valve or affect performance.

Standard reverse-acting design with spring return uses air to open so it fails closed. (Direct-acting available as an option.)

Unique parabolic plug provides accurate modulation of flow over complete valve stroke.

Suitable for a wide range of applications in the 1/2" to 1 1/2" pipe size range.

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Accuracy by Design – Not by Accident

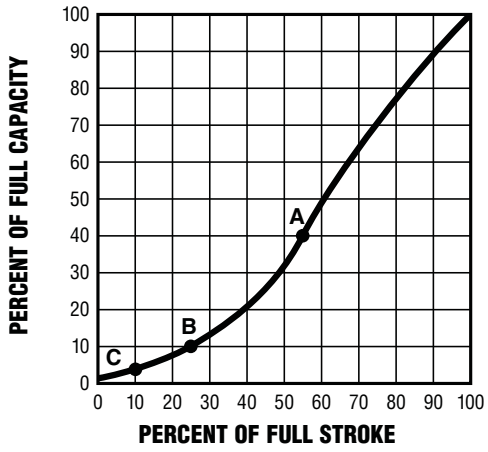
The secret of accurate control is making sure a valve's control characteristics match the application. When they do, the valve controls accurately (without hunting) and performs reliably. When there's no match, the valve simply cannot do what the application demands.

Armstrong uses a modified parabolic plug to handle exceptionally low output. The modification of true linear characteristics provides more precise control when capacity requirements are very low and the valve is just cracked off the seat. Notice in Figure 281-1 that at point A on the curve more than half the valve stroke is devoted to 40% of the unit's capacity. At point B, 1/4 of the stroke is devoted to only 10% of capacity. At point C, 10% of the stroke covers less than 5% of the unit's capacity.

How low can the unit control? Table 282-1 on page 282 tabulates this function, called rangeability. Rangeability is the ratio between the maximum controllable flow and the minimum controllable flow through the valve. The higher the rangeability of a valve, the more accurately it can control flow when low output is required. If rangeability is too low, the valve will "hunt" excessively when low output is required.

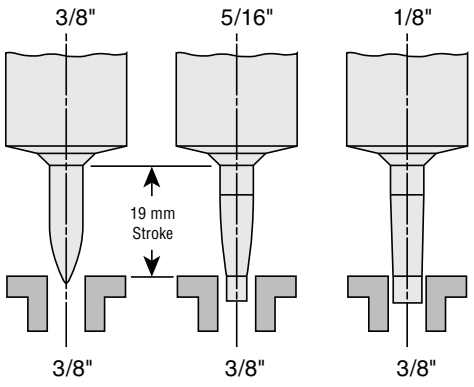
To calculate minimum flow, simply multiply Cv by the percentages shown in the table. For example, a 5/16" orifice in an ACV-02 has a Cv of 2,5. The lowest output that can be controlled is 2% of maximum flow.

Figure PTC-281-1. Modified Linear Curve



Modified linear characteristics curve for valves used under modulating control. The modification of true linear characteristics provides more precise control when capacity requirements are very low and the valve is just cracked off the seat.

Figure PTC-281-2. Parabolic Plug Type Valves



Parabolic plug valve configuration permits accurate modulation of flow over the complete stroke of the valve.

All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.

Control Valve Capacity Calculations

Table PTC-282-1. Control Valve Rangeability (Normally Closed Valves)

Control Valve Model	Valve Equivalent Diameter in Inches	Rangeability Ratio of Flow Max:Min	Rangeability Flow Coefficient CV	Standard Operators: Armstrong C-1801	Sauter AV42 P10	Honeywell MP953D	Honeywell MP953F	Belimo NVF24	Honeywell ML7425A	Belimo AF24SR
				Maximum Operating Pressure in barg						
ACV-06	1 1/2"	63:1	27,0	N/A	8,6	1,7	10,3	N/A	4,1	6,8
	1 1/4"	69:1	21,0							
	1 1/8"	61:1	19,5							
	1"	53:1	18,0			2,1			5,2	8,6
	7/8"	44:1	16,0							
	3/4"	33:1	13,0							
ACV-04	1"	53:1	13,0	N/A	8,6	4,8	10,3	4,1	10,3	10,3
	3/4"	33:1	10,5							
	5/8"	25:1	8,5							
	9/16"	105:1	7,0							
	1/2"	97:1	6,0							
	7/16"	75:1	5,0							
ACV-03 ECV-03	3/4"	118:1	7,5	5,5	8,6	5,5	10,3	4,1	10,3	10,3
	5/8"	123:1	6,5							
	9/16"	105:1	6,0							
	1/2"	97:1	5,5	10,3	8,6	10,3				
	7/16"	75:1	4,0							
ACV-02 ECV-02	1/2"	97:1	4,0	10,3	8,6	10,3	10,3	4,1	10,3	10,3
	7/16"	75:1	3,5							
	3/8"	70:1	3,0							
	5/16"	49:1	2,5							
	1/4"	31:1	1,7							
	3/16"	18:1	0,9							
	1/8"	37:1	0,45							
	1/16"	10:1	0,09							

Table PTC-282-2. Selection Formulas

For Steam

For Water: $Q = \frac{0,86 \times C_v \times \sqrt{\Delta P}}{\sqrt{G}}$

For Steam: When $P_2 > \frac{P_1}{2}$ $W = 20 \times C_v \times \sqrt{\Delta P \times P_2}$

When $P_2 < \frac{P_1}{2}$ $W = 10 \times C_v \times P_1$

Formula Key

C_v = Valve flow coefficient
G = Specific gravity in kg/dm³
Q = Maximum flow capacity of liquid in Nm³/h
P_1 = Inlet pressure in bar(a)
P_2 = Outlet pressure in bar(a)
ΔP = Pressure drop (P_1 - P_2) in bar
W = Maximum flow capacity of steam in kg/h

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Control Valve Physical Data

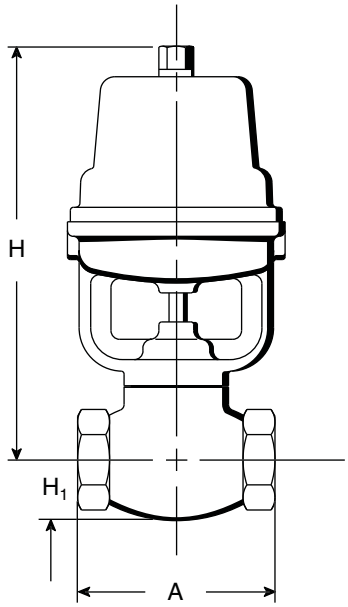

Table PTC-283-1. Specifications						Dimensions and Weights		
Model Number	**Pipe Size in mm**	**Body Material**	**Trim Material**	**Vessel Design Limitation**	**Minimum Δ P**	**A in mm**	**H_1 in mm**	**Weight in kg**
Control Valve ACV-02 ACV-03 ACV-04 ACV-06	 1/2" 3/4" 1" 1 1/2"	Cast Iron	300 Series Stainless Steel	17 bar @ 204°C	0,14 bar	 105 108 140 203	 29 33 48 62	 4,4 4,8 5,3 10,0
ECV-02 ECV-03	1/2" 3/4"	T-316 Stainless Steel		27,5 bar @ 204°C		105 108	29 33	3,9 4,3

All sizes comply with the article 4.3 of the PED (2014/68/UE).

Table PTC-283-2. Physical Data "H" Dimensions in mm							
Model Number	**Armstrong C-1801**	**Honeywell MP953D**	**Honeywell MP953F**	**Sauter AV42 P10**	**Honeywell ML7425A**	**Belimo AF24SR**	**Belimo NVF24-MFT-US E**
ACV/ECV-02	216	178	302	361	313	386	295
ACV/ECV-03	225	187	311	370	322	395	305
ACV-04	—	203	324	386	338	411	318
ACV-06	—	229	352	415	367	440	346

How to Order

Body Material
A = Cast Iron
E = T-316 Stainless Steel

Product Line
CV = Control Valve

Connection Size
02 = 1/2"
03 = 3/4"
04 = 1"
06 = 1 1/2"

Standard Operator Types
Pneumatic Modulating
AM = Armstrong C-1801
HAM = Honeywell MP953D and F
SRAM = Sauter AV42 P10

Electric Modulating
HEM = Honeywell ML7425A
BELEM = Belimo AF24SR
BNVEM = Belimo NVF24-MFT-US-E

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