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).

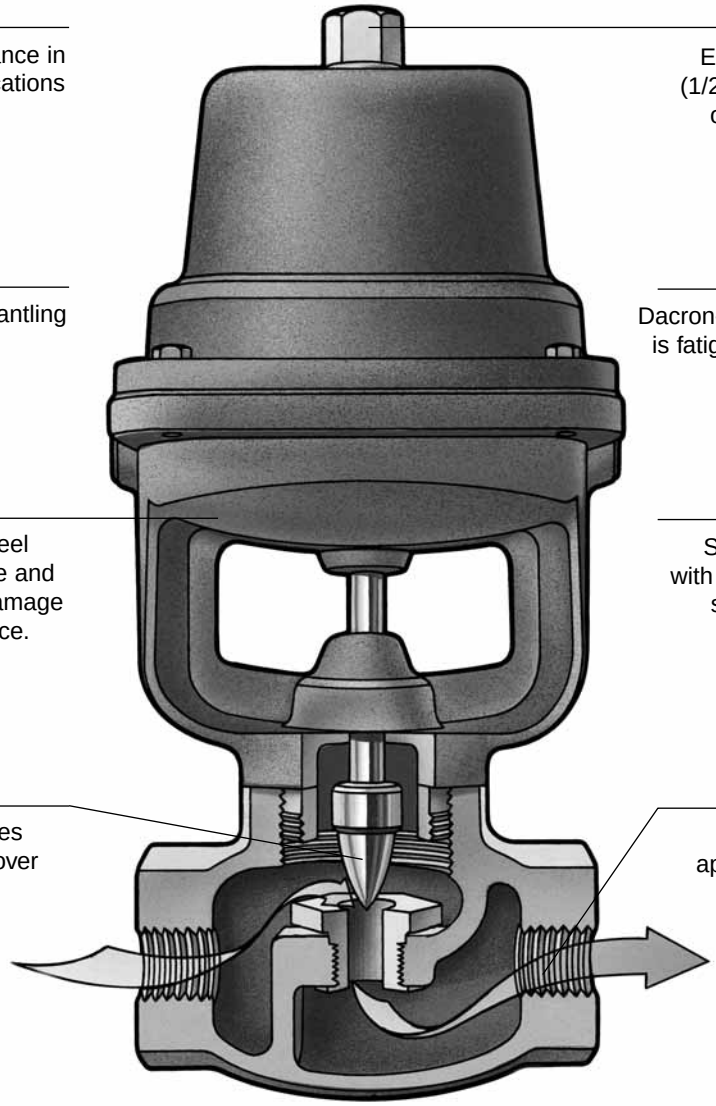
NOTE: For water service, the valve must be piped in reverse.

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

Repairs quickly without dismantling the piping.

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

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



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

Dacron-reinforced silicone diaphragm is fatigue and temperature resistant.

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

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

Accuracy by Design – Not by Accident

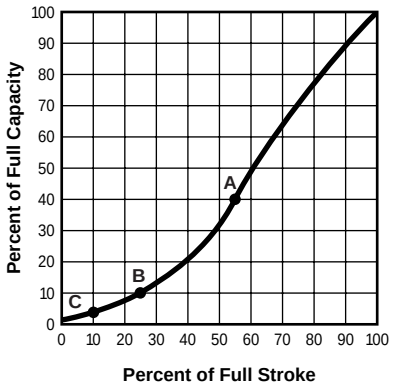
The secret of accurate control is making sure a valve's control characteristics match the application. When they do, the valve controls accurately (without hunting) and performs reliably. When there's no match, the valve simply cannot do what the application demands.

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 the chart below 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? The table below 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.

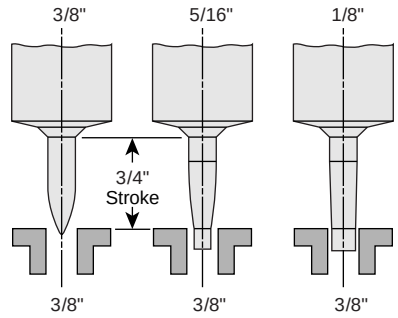
To calculate minimum flow, simply multiply C_V by the percentages shown in the table. For example, a 5/16" orifice in a CV-02 has a C_V of 2.5. The lowest output that can be controlled is 2% of 2.5, or .05 gpm.

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.

Parabolic Plug Type Valves



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

Control Valve Rangeability (Normally Closed Valves)

Control Valve Model	Valve		Rangeability		Standard Operators													
	Equivalent Diameter		Ratio of Flow Max:Min	Flow Coefficient C_V	Armstrong C-1801		Invensys MK4411 & MK4421		Honeywell MP953D		Honeywell MP953F		Belimo NVF24-MFT-US-E		Honeywell M9182A		Belimo AF24SR	
					Maximum Operating Pressure													
	in	mm			psig	bar	psig	bar	psig	bar	psig	bar	psig	bar	psig	bar	psig	bar
ACV-06	1-1/2	38	63:1	27	N/A		N/A		25	1.7	150	10.3	N/A		100	6.8	100	6.8
	1-1/4	32	69:1	21														
	1-1/8	28	61:1	19.5														
	1	25	53:1	18					30	2.1					125	8.6	125	8.6
	7/8	22	44:1	16														
	3/4	20	33:1	13														
ACV-04	1	25	53:1	13	N/A		N/A		70	4.8	150	10.3	60	4.1	150	10.3	150	10.3
	3/4	20	33:1	10.5														
	5/8	16	25:1	8.5														
	9/16	14	105:1	7														
	1/2	15	97:1	6														
	7/16	11	75:1	5														
ACV-03 ECV-03	3/4	20	118:1	7.5	80	5.5	80	5.5	80	5.5	150	10.3	60	4.1	150	10.3	150	10.3
	5/8	16	123:1	6.5														
	9/16	14	105:1	6														
	1/2	15	97:1	5.5	150	10.3	150	10.3	150	10.3								
	7/16	11	75:1	4														
ACV-02 ECV-02	1/2	15	97:1	4	150	10.3	150	10.3	150	10.3	150	10.3	60	4.1	150	10.3	150	10.3
	7/16	11	75:1	3.5														
	3/8	10	70:1	3														
	5/16	8	49:1	2.5														
	1/4	6	31:1	1.7														
	3/16	5	18:1	0.9														
	1/8	3	37:1	0.45														
	1/16	1.5	10:1	0.09														

NOTE: ACV is available in cast iron and ECV is available in stainless steel.

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Next

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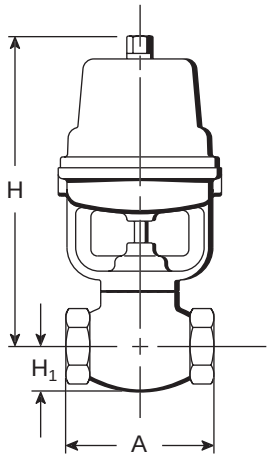

Specifications

Model Number	Pipe Size		Body Material	Trim Material	Vessel Design Limitation	Minimum ΔP	A		H_1		Weight	
	in	mm					in	mm	in	mm	lb	kg
Control Valve												
ACV-02	1/2	15	Cast Iron	300 Series Stainless Steel	250 psig @ 400°F 17 bar @ 204°C	2 psi (.14 bar)	4-1/8	105	1-1/8	29	9-3/4	4.4
ACV-03	3/4	20					4-1/4	108	1-5/16	33	10-1/2	4.8
ACV-04	1	25					5-1/2	140	1-7/8	48	11-3/4	5.3
ACV-06	1-1/2	40					8	203	2-7/16	62	22	10
ECV-02	1/2	15	T-316 Stainless Steel		400 psig @ 400°F 27.5 bar @ 204°C		4-1/8	105	1-1/8	29	8-1/2	3.9
ECV-03	3/4	20					4-1/4	108	1-5/16	33	9-1/2	4.3

Physical Data "H" Dimension

Model Number	Armstrong C-1801		Honeywell MP953D		Honeywell MP953F		Invensys MK4411 & MK4421		Honeywell M9182A		Belimo AF24SR		Belimo NVF24-MFT-US-E	
	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
ACV/ECV-02	8-1/2	216	7	178	11-7/8	302	11-1/2	292	11-5/8	295	15-3/16	386	11-5/8	295
ACV/ECV-03	8-7/8	225	7-3/8	187	12-1/4	311	11-7/8	302	11-13/16	300	15-9/16	395	12	305
ACV-04	—		7-7/8	200	12-3/4	324	12-3/8	314	12-3/8	314	16-3/16	411	12-1/2	318
ACV-06	—		9	229	13-7/8	352	13-1/2	343	12-15/16	329	17-5/16	440	13-5/8	346

Selection Formulas/C_v Value Calculations

For Water: $GPM = \frac{C_v \times \sqrt{\Delta P}}{\sqrt{G}}$

For Steam: When $P_2 > \frac{P_1}{2}$ $W = 3 \times C_v \times \sqrt{\Delta P \times P_2}$

When $P_2 \leq \frac{P_1}{2}$ $W = 1.5 \times C_v \times P_1$

Formula Key

C_v = Valve flow coefficient
G = Specific gravity
GPM = Maximum flow capacity of liquid GPM
P_1 = Inlet pressure, psia (psig + 14.7)
P_2 = Outlet pressure, psia (psig + 14.7)
ΔP = Pressure drop (P1 - P2) psi
W = Maximum flow capacity of steam, lb/hr

For a fully detailed certified drawing, refer to CD #1247.

How to Order

Body Material
ACV = Cast Iron
ECV = 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
INAM = INVENSYS MK4411 or 4421

Electric Modulating
HEM = Honeywell M9182A
BLEM = Belimo AF24SR
BNVEM = Belimo NVF24-MFT-US-E