Control Valve Authority

Authority of a control valve from its pressure drop and the rest of the circuit's, with the installed flow at an opening for a linear or equal-percentage valve.

Method: Valve authority and installed characteristic (CIBSE Guide H; series flow resistance)

Input parameters

Unit system: SI

Parameter	Value	Unit
Pressure drop across the fully open valve	30.000	kPa
Pressure drop in the rest of the circuit at design flow	70.000	kPa
Valve travel	50.000	%
Rangeability (equal percentage)	50.000	

Calculated results

Parameter	Value	Unit
Valve authority Δp_v / (Δp_v + Δp_s)	30.000	%
Installed flow share, linear valve	72.548	%
Installed flow share, equal-percentage valve	25.238	%

Notes for this case

- Installed flow with a constant total pressure difference. Authority of at least 0.25 (0.5 is often preferred in HVAC) is common design practice, not a code limit.

Formula and method

$$N = \frac{\Delta p_v}{\Delta p_v + \Delta p_s}, \quad q = \frac{1}{\sqrt{N/f^2 + (1 - N)}}$$

Variables

Δp_v	Pressure drop across the fully open valve	Pa
Δp_s	Pressure drop in the rest of the circuit at design flow	Pa
x	Valve travel	-
R	Rangeability (equal percentage)	-
N	Valve authority Δp_v / (Δp_v + Δp_s)	-
q_{lin}	Installed flow share, linear valve	-
q_{eq}	Installed flow share, equal-percentage valve	-

Method and standards

Valve and circuit resistances in series.

Assumptions and limits

- The 0.25 lower limit flagged on the page is a common rule of thumb for acceptable control (many HVAC designers aim for 0.5); it is practice, not a figure from a standard.
- Constant total ΔP.

References

- Valve authority and installed characteristic (CIBSE Guide H; series flow resistance)

Report details

Report reference	FCC-QTM7-CSJA (the same inputs always give the same reference)
Generated	17 November 2026, 19:34 UTC
Calculator	Control Valve Authority
Method last reviewed	12 November 2026
Software release	FireCAD Calc, release of 17 November 2026
Release checks	3 reference cases of this calculator, computed independently, are checked on every release

Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

This calculator online

https://calc.firecad.com/instrumentation/control-valves/valve-authority

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.