Following is Griswold Controls' simple, 4–step system for valve selection and sizing. This guide will assist you in choosing the appropriate valve size, valve type and Cv for your specific application needs. If your valve does not fit into one of the categories outlined below, please contact us and we will assist you in selecting a valve.

Step 1 SELECT ΔP ACROSS THE CONTROL VALVE

(If the ΔP across the control valve is known, please skip to step 2).

On/Off and Tri/State Valves (Low Pressure Drop across the valve is needed)

- If the available branch pressure is known, the control valve ΔP should be 10% to 20% of the branch ΔP.
- If the available branch pressure is not known, select a valve size that is equal to the line size and a Cv that is in the middle to high end of the Cv's available.

Proportional Control of Water, 2–Way Valves and 3–Way Valves in mixing applications (High Pressure Drop across the valve is needed)

- If the coil ΔP is known, the control valve ΔP should be equal to or greater than the coil ΔP.
- If the coil ΔP is not known, the industry standard for the control valve ΔP is between 3 and 5 psi. Before selecting your valve ΔP, please read the following notes:

a. It is good practice to make the Valve Authority[1] higher than 40% to guarantee adequate control of the fluid. Authorities higher than 50% are ideal. If a control valve Cv is selected that is too low, it may not produce a high enough percentage of total branch ΔP to achieve good authority.

b. While selecting a valve with large pressure drops will increase authority, there is a limit to the maximum ΔP that can be selected before cavitation[2] occurs in the valve. A conservative guide is: Maximum Allowable Pressure Drop = 0.5 (Inlet Pressure (psia) - Water Vapor Pressure (psia)).

Water Temp	Vapor Pressure (psia)	Water Temp	Vapor Pressure (psia)	Water Temp	Vapor Pressure (psia)
35	0.10	85	0.61	175	6.70
45	0.15	95	0.83	190	9.30
55	0.22	105	1.12	200	11.50
65	0.31	125	1.90	210	14.10
75	0.44	150	3.70	220	17.19

Proportional Control of Water, 3–Way Valves in diverting applications (A Low Pressure Drop across the valve is needed)

- The control valve ΔP should be about 20% of the branch ΔP and should not exceed the pressure drop of the coil. (Valve should not be sized without knowing required pressure drop.)

Step 2 SELECT TYPE OF VALVE REQUIRED

Application Requirements

On/Off or Tri-State Valve

- In two position applications there is no reason to select a valve with a flow optimizer unless the valve may be changed to modulating at a later date or if the Cv requirement dictates an Optimizer.

Multi-Function

- If you want to combine Flow Limiting with Equal Percentage Flow Control, choose the Automizer.

NOTES

[1] Valve Authority is defined as the ratio of the ΔP across the valve to the ΔP across the branch at design flow. Authority = Valve ΔP / Branch ΔP.

[2] Cavitation is an effect that occurs in a valve or component when the velocity of the fluid is so high (causing low pressure) that the fluid vaporizes. Then, as the fluid slows down and the pressure increases, the vapor bubbles collapse back into a liquid state. The vapor bubbles imploding cause noise and vibration in the valve and can eventually destroy the valve.

Replaces form F-4334D 6/06

F-4334E

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Step 3 <u>SELECT Cv</u>

To determine the Cv required for the control valve, the valve □P and the flow rate must be known.

To calculate the Cv, you have two options:

- Use the Flow Rate Tables for individual valves in the following specs:

  Unimizer 2-Way (F-4206)

  Unimizer 3-Way (F-4306)

  Unimizer Union (F-4230)

  Automizer (F-4207)

- Use the following formulas:

  For water, use $Cv = Q / \sqrt{\Delta P}$ where Q = Flow Rate in GPM

  For fluids other than water, use $Cv = Q\sqrt{SG} / \sqrt{\Delta P}$ where Q = Flow Rate in GPM and SG = Specific Gravity.

Example:

Suppose our application calls for proportional control of water in a 2-way valve. Therefore, a high ΔP across the control valve is required.

For our valve, we don't know the ΔP across the valve, but a coil ΔP of 3 PSID and a desired flow rate of 5 GPM are defined by the needs of the system. We will choose a ΔP across the control valve that is slightly more than the coil ΔP: 4 PSID.

Using flow equation to find the Cv: $Cv = Q / \sqrt{\Delta P}$

$Cv = 5 / 2$

$Cv = 2.5$

2.5 is the "ideal" Cv for this valve. The next step is to find the closest "actual" Cv that is equal to or larger than 2.5 in the valve type desired. This can be found on the individual valve selection tables. We have a match for a Cv of 2.5 in a Unimizer from the Unimizer Cv Selection Table. (If your required GPM at desired ΔP is on the tables, you could skip the equation.)

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