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## Specifying Control Valve Data

If you want to manually set control valves to a particular position, or if you want to know the calculated Cv value at any given position, then you must supply valve performance data to your control valves. There are a couple of ways to specify control valve data. If you have the full range of performance data available from the manufacturer, then you can manually enter the data on the Control Valve Data tab. If you do not have the data available, then you can estimate the valve's performance data by selecting from a list of design and flow characteristics. Then you simply need one flow coefficient value for the valve.

### Manually Specifying Control Valve Data:

When you click on the Data tab for a control valve, you will see the data dialog box for the valve like the one shown in Figure 1.

**Control Valve**

Control Valve | **Data** | Symbol | Notes | Links

Dimensions

Valve size: 2 in    Seat size: 2 in    Stroke: 1.125 in

Data Values

		Cv	FI	Xt
Actuator:	5%	1.9	0.9	
<input checked="" type="radio"/> Linear				
<input type="radio"/> Rotary	10%	2.2	0.9	
Flow coefficient:	20%	3.4	0.9	
<input checked="" type="radio"/> Cv				
<input type="radio"/> Kv	30%	4.6	0.9	
Valve style modifier (Fd):	40%	6.4	0.9	
1	50%	9.1	0.9	
Laminar flow factor (Fs):	60%	13.5	0.9	
1.1	70%	22	0.9	
	80%	34.6	0.9	
	90%	44.5	0.9	
	100%	50	0.9	

OK    Cancel    Help

**Figure 1. Control Valve Data**

*Enter Dimension Data:*

**Valve size:** The diameter of the valve body.

**Seat size:** The diameter of the seat area.

**Stroke:** The amount of linear valve travel available for the valve stem from fully closed to fully open.

*Enter Data Values:*

**Actuator:** Select Linear or Rotary.

**Flow coefficient:** Cv or Kv.

**Cv** = volume of 60°F water (US gpm) which will flow through the valve at 1 psi d.

**Kv** = volume of 5°C-40°C water (m<sup>3</sup>/hr) which will flow through the valve at 1 bar-d.

**Valve style modifier (Fd):** A valve capacity factor. The default value is 1.

**Laminar flow factor (Fs):** A valve capacity factor. The default value is 1.1.

**Cv (or Kv) Column:** The valve flow coefficients at each of the given valve positions.

**Fl Column:** The liquid pressure recovery factor. This a measure of the valve's ability to convert the kinetic energy of the fluid at the vena contracta back into pressure. Must be specified for use with liquid applications.

**Xt Column:** The rated pressure drop ratio factor. Must be specified for use with gas applications.

#### Valve Capacity Factors

If you have the flow coefficient data, but do not have the data for the valve capacity factors then you can use representative values taken from the ISA Standard S75.01 – 1985 for the valve capacity factors XT, FL, Fs and Fd. Table 1 lists these representative values.

Valve Type		Trim Type	Flow Direction*	X <sub>T</sub>	F <sub>L</sub>	F <sub>c</sub>	F <sub>d</sub> **
Globe	Single Port	Ported plug	Either	0.75	0.9	1.0	1.0
			Open	0.72	0.9	1.1	1.0
		Contoured plug	Close	0.55	0.8	1.1	1.0
			Open	0.75	0.9	1.1	1.0
	Characterized cage	Close	0.70	0.85	1.1	1.0	
		Either	0.75	0.9	1.1	1.0	
	Double Port	Wing guided	Either	0.75	0.9	0.84	0.7
			Either	0.70	0.85	0.85	0.7
			Either	0.75	0.9	0.84	0.7
	Rotary	Eccentric spherical plug	Open	0.61	0.85	1.1	1.0
Close			0.40	0.68	1.2	1.0	
Angle	Contoured plug	Open	0.72	0.9	1.1	1.0	
		Close	0.65	0.8	1.1	1.0	
	Characterized cage	Open	0.65	0.85	1.1	1.0	
		Close	0.60	0.8	1.1	1.0	
	Venturi	Close	0.20	0.5	1.3	1.0	
Ball	Segmented	Open	0.25	0.6	1.2	1.0	
	Standard port (d <sub>js</sub> ≈ 0.8d)	Either	0.15	0.55	1.3	1.0	
Butterfly	60-Degree aligned	Either	0.38	0.68	0.95	0.7	
	Fluted vane	Either	0.41	0.7	0.93	0.7	
	90-Degree offset seat	Either	0.35	0.6	0.98	0.7	

**Table 1. Valve Capacity Factors**


\* Flow direction tends to open or close the valve, i.e., push the closure member away from or towards the seat.

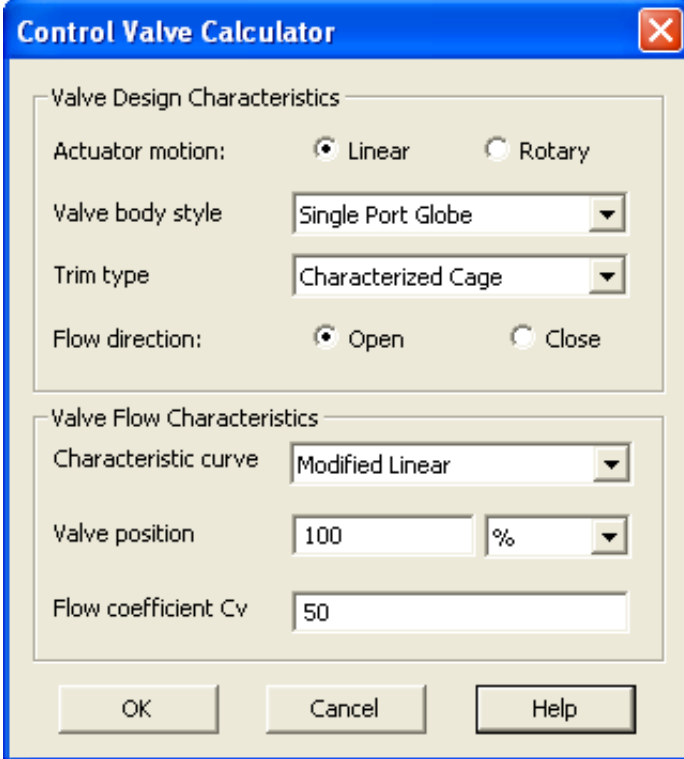
\*\* In general, an Fd value of 1.0 can be used for valves with a single flow passage. An Fd value of 0.7 can be used for

valves with two flow passages, such as double-ported globe valves and butterfly valves.

## Estimating Control Valve Data:

If you don't have all of the Cv data or valve capacity data for a valve, you can estimate the valve data by clicking on the Control

Valve Calculator button . When you click on this button you will see the Control Valve Calculator dialog box like the one shown in Figure 2. Data must be entered from top to bottom in order.



**Figure 2. Control Valve Calculator**

### *Enter Valve Design Characteristics:*

The valve design characteristics are used to determine the valve capacity factors.

**Actuator motion:** Select Linear or Rotary as on the control valve Data tab.

**Valve body style:** Select Globe, Angle, Ball or Butterfly valve depending on the actuator.

**Trim type:** The characterization of the opening and closing member of the valve. Selections depend upon actuator and valve body.

**Flow direction:** Select "flow to open" or "flow to close".

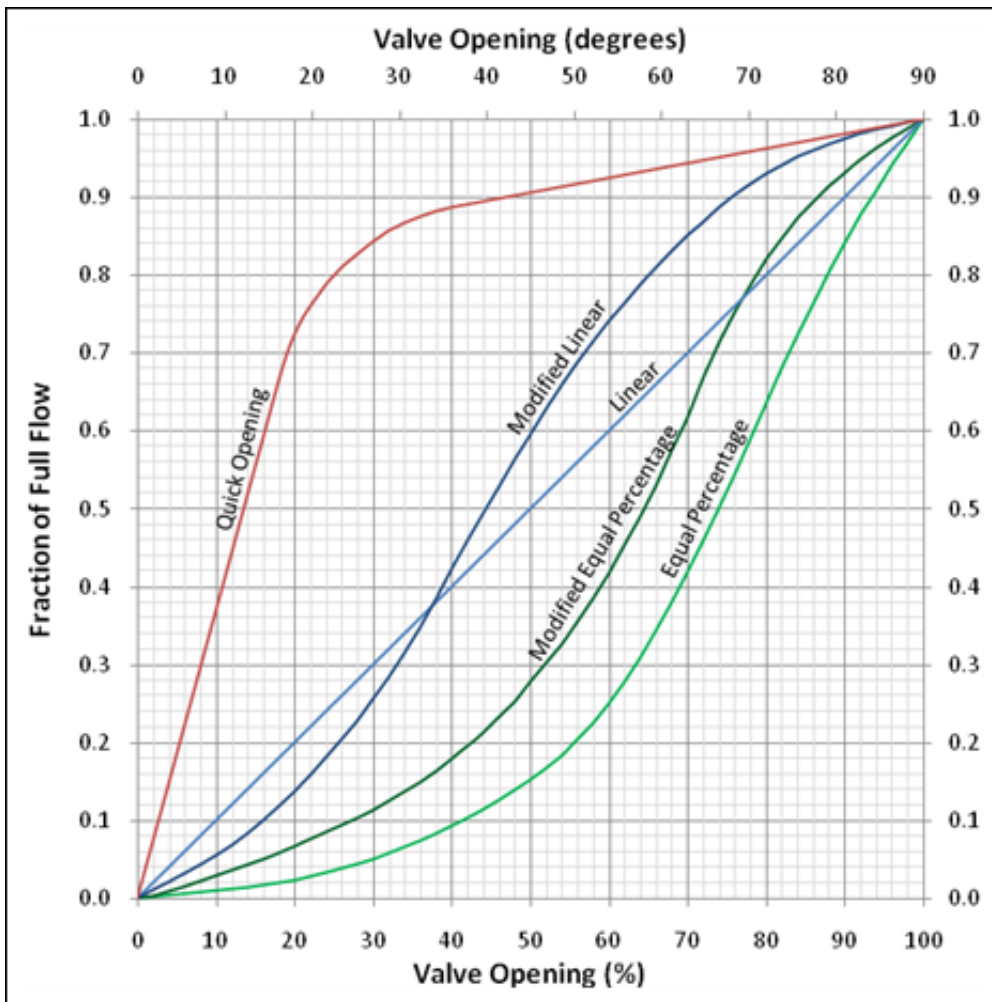
### *Enter Valve Flow Characteristics:*

The valve flow characteristics are used to determine the full range of flow coefficients and valve positions.

**Characteristic curve:** This determines the flow characterization of the valve. Options include Equal Percentage, Linear, Modified Equal Percentage, Modified Linear, and Quick Opening. Refer to Figure 3 below for a graphic representation of valve opening vs. fraction of full flow for each of these curves.

**Valve position:** Specify the valve position (in percent or degrees) at which your single flow coefficient is determined. Most manufacturers will at least give one Cv or Kv value at the fully open position (100% or 90 degrees).

**Flow Coefficient Cv (or Kv):** the Cv or Kv value at the given valve position.



**Figure 3. Control Valve Flow Characteristics**

**NOTE:** These flow characteristic curves were developed after extensive research and comparisons of the performance curves of many different valve manufacturers. These characteristic curves are smoothed, best fit representations of an average of those manufacturers' curves.

After you've entered the design and flow characteristics for your valve, click the OK button. This will generate all of the valve data necessary for use within the program.