Design Features and Operating Concepts

Valves with electro-mechanical actuators
for quick opening or closing action

Normally closed shut-off valves are used in burner system fuel supply lines on industrial boilers, furnaces, ovens, kilns, and other heating processes. All valves are designed to shut-off fuel automatically and instantly with any interruption in the electric power supplied through your safety circuit.

These valves are also used for the **manual** or **motorized** opening or closing of pipe lines carrying gases and liquids commonly used in industrial processes. Normally closed valves cannot be opened until the interlocking safety control circuit is proven and resulting electrical power is supplied to the shut-off valve.

Motorized automatic valve actuators are used where remote access or unmanned applications are needed.

NOTE: Valve motors are protected against thermal overload. Normal duty cycles of 1 cycle per minute or less should allow motor thermal overload to sufficiently cool between cycles. If the normal valve duty cycle is exceeded, the motor must be allowed to cool before the thermal protection will automatically reset.

Manual reset actuators require operating personnel to be physically present to actuate the valve from its at rest position.

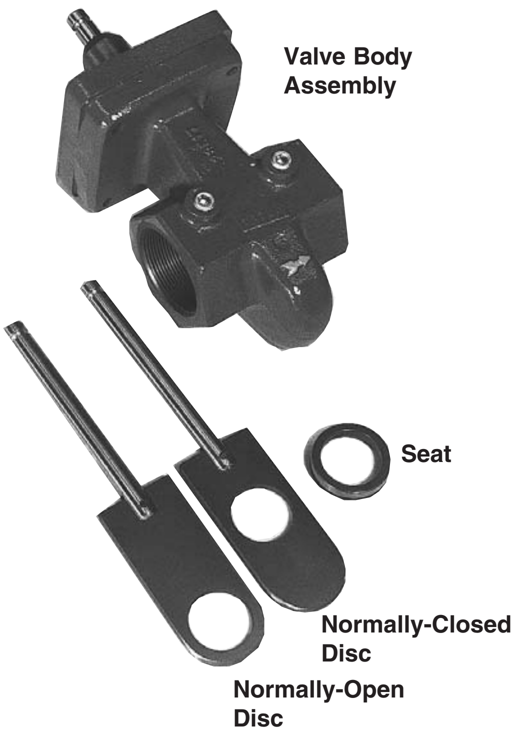
Normally open vent valves are most often used as the bleed valve in a block-and-bleed pipe train, sometimes required by insurance authorities. They are designed to open a vent line automatically and instantly upon any interruption in the electric power supply through your safety control circuit.

These normally open valves are also used in protective atmosphere systems and other gaseous and fluid service requiring quick opening or by-pass purging action.

Like the normally closed versions, both automatic and manual reset actuators are available for remote access locations, or when operating personnel's physical presence is preferred.

All Maxon valves feature one-piece cast iron or cast steel bodies with micro-lapped seats and discs. Straight through flow path minimizes pressure drop through full open swinging gate or rising stem (guillotine action) bodies.

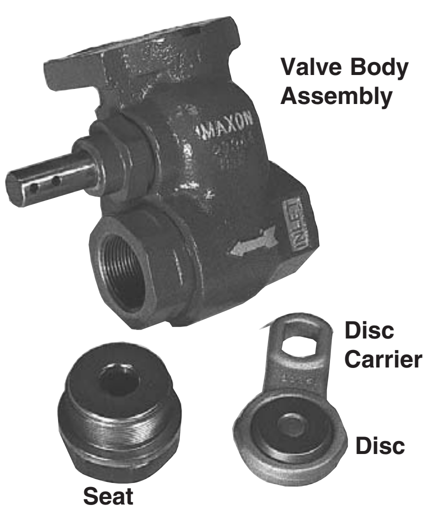
Valve Body Design Details



To provide seals in your process service lines, Maxon uses two different styles of valve bodies:

Rising stem (guillotine action) bodies are frequently used in normally closed and normally open gas valves. The micro-lapped, spring loaded guillotine disc gets a pressure assist from the flowing gases to seal against the downstream micro-lapped metal seat ring. The carefully machined seal surfaces and extremely close tolerances of the valve body operating mechanism promote positive closing action. Frequent cycling action constantly shears accumulated dirt or residue from the disc and seat to insure instantaneous and reliable sealing.

The location of the port in the disc is the basic difference between normally open and normally closed valve bodies. Both valves function by the top assembly mechanism driving the stem and disc down into the valve body, opening (or closing) the flow path. Both valves trip to their rest position when their top assembly's compression spring is released to pull the stem and connected disc up out of the body.



Swinging gate bodies are frequently used in normally closed oil valves and for some non-combustible gas applications. This design provides the same seal capabilities, but in a slightly different operating mode. The hard faced micro-lapped seat nut is threaded into the one-piece valve body. The free-floating, hard faced, spring loaded circular disc swings across the seat. Line pressure also assists in sealing the disc to the downstream seat.

Here again, frequent use and cycling actually helps to keep your valve clean. Since the free-floating disc is swinging across the circular seat nut on the arc created by the disc carrier, the disc rotates slightly on every cycle. This provides a fresh, clean surface area for sealing off the flow lines.

Maxon valve bodies have special service trim options available to meet your particular fluid service requirements. Contact your Maxon representative for details.

Valve Body Capacities/Specifications

Table 1: Normally closed valve bodies

Body Material	End Connections	Pipe Size (in inches)	Cv Factor	Body Type [1]
Gray Iron	Threaded	.375 & .5	3.4	SG
		.75	9.6	SG
			20	RS
		1	12	SG
			20	RS
		1.25	17	SG
			45	RS
		1.5	53	RS
		2	86	RS
		2.5	127	RS
			304	RS
		3	173	RS
			423	RS
	Flanged	2	86	RS
		2.5	127	RS
			304	RS
		3	423	RS
		4	490	RS
			719	RS
		6	869	RS
			1172	RS
Cast Steel or Stainless Steel	Threaded	.5	3.4	SG
		.75	9.6	SG
		1	12	SG
			20	RS
		1.25	17	SG
			45	SG
		1.5	53	RS
		2	86	RS
	Flanged	2.5	304	RS
		3	423	RS
		4	490	RS
			719	RS
		6	869	RS
			1172	RS

[1] RS = Rising Stem valve body
SG = Swinging Gate valve body

See catalog pages 6117-6119 for construction details.

NOTE: Typically, pressure drop for gas flows should not exceed 10% of inlet pressure; however, for 2" and smaller valves, the drop should not exceed 5 PSIG, and for 2.5" and larger valves, must not exceed 2.5 PSIG.
Select valve size on basis of the **lower** of these parameters to avoid critical flow conditions.

Table 2: Normally open valve bodies

Body Material	End Connections	Pipe Size (in inches)	Cv Factor	Body Type [1]
Gray Iron	Threaded	.75	20	RS
		1	20	RS
		1.5	53	RS
		2	86	RS
		2.5	304	RS
		3	423	RS
	Flanged	2	86	RS
		2.5	304	RS
		3	423	RS
		4	490	RS
Cast Steel	Threaded	1	20	RS
		1.5	53	RS
		2	86	RS
	Flanged	2.5	304	RS
		3	423	RS
		4	490	RS

Each complete valve assembly must include one of these valve bodies, regardless of ultimate series designation.

Flows through the valve body and resulting pressure drops may be estimated by inserting your specific conditions into the following formula and using C_v flow factors given for each valve body.

Gases: $Q = (1360) \times (C_v) \times \left(\sqrt{\frac{(P_1+P_2)}{G\,T_f}}\right) \times \left(\sqrt{\frac{(P_1-P_2)}{2}}\right)$

Liquids: $V = (C_v) \times \left(\sqrt{\frac{(P_1-P_2)}{G_f}}\right)$

Where:

- G = Gas specific gravity (air = 1.0)
- G_f = Specific gravity @ flowing temperature °F
- P_1 = Inlet pressure PSIA (14.7 psi + psi gauge)
- P_2 = Outlet pressure PSIA (14.7 psi + psi gauge)
- Q = Cubic feet per hour @ 14.7 PSIA and 60°F
- T_f = Flowing temperature absolute (460° + °F)
- V = Flow in U.S. gallons/minute of water