

# Red Valve

## Control Valves



# Red Valve: The Best Choice for the Toughest Applications

*Red Valve's corporate headquarters in Pittsburgh, PA*

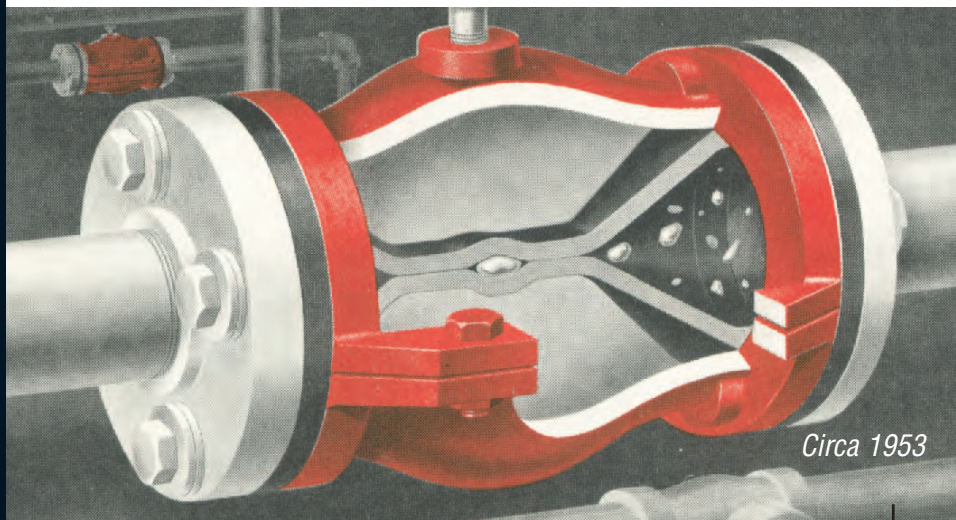


## **A Worldwide Customer Service Network**

*Red Valve offers a worldwide, world-class customer service network. With manufacturing plants in Charlotte, NC, and Pittsburgh, PA, and sales representatives in 175 cities in 75 countries around the globe, Red Valve has the sales engineering team to help you select the best choice of valve and related products for your applications.*

*Right: Red Valve's legendary Type A Pinch Valve was invented and patented in 1953 for the world's first coal slurry pipeline.*

**Solving your most demanding flow control applications – this has been the single, driving force behind Red Valve since our founding in 1953. Today we remain dedicated to responding to your needs with valve products and engineering services that set the standard for the world's toughest applications. Our initial order was for the world's first coal slurry pipeline, where we created the only available valve capable of reliable slurry control. Today, Red Valve is the world's largest manufacturer and supplier of pinch valves and has become the preferred supplier for municipalities and industrial plants worldwide. Red Valve's global representative network stands ready to work with you to solve your toughest control applications.**



*Circa 1953*

# Providing Cost-Effective, Creative



## Meeting the Demands of Industry

Even the toughest flow control problems can be solved – precisely – with Red Valve’s wide range of control valves. Our patented Cone Sleeve handles lime, ash, chemicals, mining slurry and sludge with precise, repeatable control. ► Wherever slurry or corrosive chemicals are present, Red Valve Control Pinch Valves eliminate downtime and maintenance due to packing, seats plugging, scaling or bridging. ► The self-cleaning elastomer sleeve offers a 20:1 turndown ratio and a 0.89 pressure recovery factor, eliminating cavitation and scaling and bridging of slurries.



## Pulp and Paper Mills

Pulp stock, coating and recycled paper lines are some of the more difficult valve applications found in pulp and paper mills. The flexible elastomer sleeves of Red Valve Control Valves are custom fabricated to withstand these abrasive services:

- Cyclone Discharge
- Recycled Paper
- Pulp Stock
- Coatings
- Washwater
- pH Addition
- Lime Mud
- De-inking



# Valve Solutions



Red Valve founder Spiros G. Raftis with 36" Series 5400 Influent Flow Control Valve



## Mining Industry

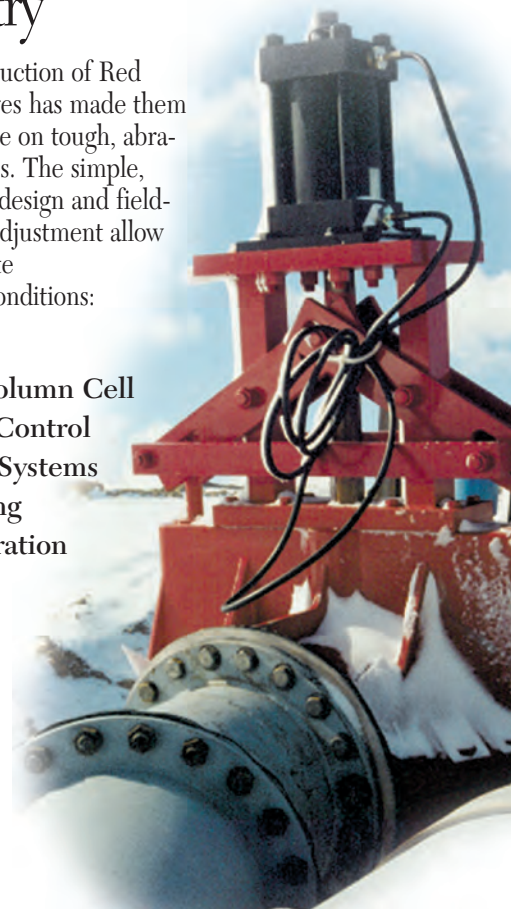
The rugged construction of Red Valve Control Valves has made them the valves of choice on tough, abrasive mining slurries. The simple, maintenance-free design and field-accessible stroke adjustment allow the valve to operate reliably in harsh conditions:

- ▶ Tailings
- ▶ Flotation Column Cell
- ▶ Centrifuge Control
- ▶ Lime Feed Systems
- ▶ Coal Washing
- ▶ Solids Separation

## General Industry

Control valves are frequently specified as original equipment by manufacturers of industrial process systems:

- |                       |                            |
|-----------------------|----------------------------|
| ▶ Pneumatic Conveying | ▶ Food and Beverage Plants |
| ▶ Tobacco Plants      | ▶ Cement, Sand, Silica     |
| ▶ Refineries          | ▶ Scrubbing                |
| ▶ Dye Plants          |                            |



# Chemical Industry

## Wastewater Treatment Plants

Accurate, repeatable linear flow control and drop-tight, bi-directional shutoff make Red Valve Control Valves ideal for these demanding wastewater treatment applications:

- ▶ Sludge Control
- ▶ Raw Sewage Control
- ▶ Flow Equalization
- ▶ Lime Control
- ▶ Polymer Feed Systems
- ▶ Grit Systems
- ▶ Influent Control

Red Valve Control Valves have no packing to maintain and no cavities, seats or cam action to bind valve operation. Chemical plants use Red Valve Control Valves for many corrosive chemical applications:

- ▶ Slurry/Chemicals
- ▶ Titanium Dioxide
- ▶ Catalyst Feed Systems
- ▶ Industrial Treatment
- ▶ Emulsive Chemicals
- ▶ Powders



*The Series 5200 Control Valve with positioner: the elastomer sleeve is the only wetted part of the valve, eliminating the need for expensive alloy bodies and allowing for maintainance ease.*

## Power Industry

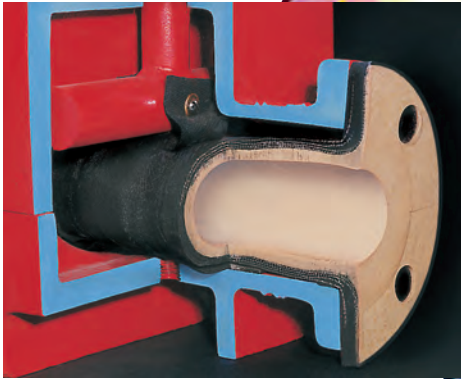
Lime and ash handling are two tough services in a power plant, and the abrasion-resistant and self-cleaning flexible elastomer sleeves of Red Valve Control Valves won't scale, bridge, plug or freeze on slurries:

- ▶ Thickener Underflow
- ▶ Wet Lime Scrubbers
- ▶ FGD Systems
- ▶ Ash Handling
- ▶ Coal Handling
- ▶ Bottom Ash



# Sleeve Trim

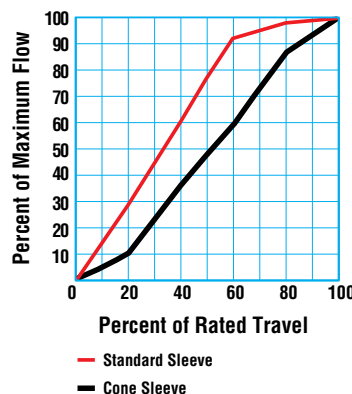
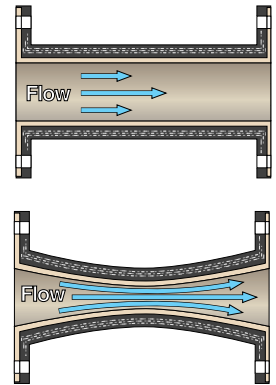
Red Valve's heavy-duty Pinch Valve sleeves are engineered with high-strength fabrics, similar to a heavy-duty truck tire.



## Pinch Valve Sleeves : Engineered to Last

Red Valve Pinch Valve sleeves are ply-reinforced, similar to a heavy-duty truck tire, with nylon, polyester or other fabrics as the engineered support of the sleeve. The elastomer wear surface of the pinch valve sleeve is chosen on the basis of chemical compatibility with the application. All Red Valve sleeves feature full-face integral flanges that extend through the entire valve length and onto the face of the mating flange.

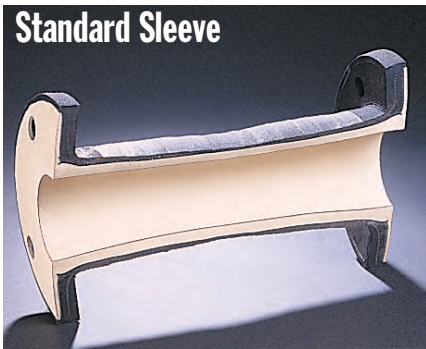
Only a Red Valve Pinch Valve offers a laminar, non-turbulent flow pattern, due to the internal configuration of the sleeve. The flow pattern is streamlined, even when throttled.



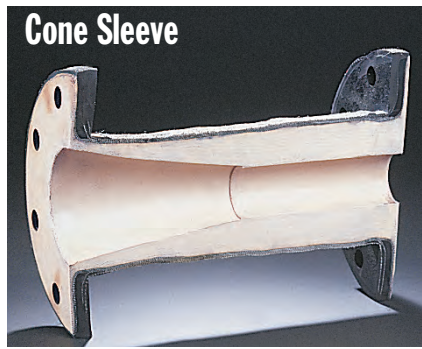
# Designs

In the open position, there is virtually no wear or turbulence on the Red Valve Pinch Valve sleeve. Unlike flow patterns of conventional valves, which create a deflection that causes wear, the flow pattern of a Red Valve Pinch Valve is streamlined, even when throttled.

Typically, Red Valve Control Pinch Valves are furnished with Cone Sleeve trims for throttling applications. Red Valve's Cone Sleeve trim is designed to have inherent linear flow characteristics. These linear characteristics result in flow rates that are directly proportional to the amount of sleeve travel throughout the stroke of the valve while under constant pressure and pressure-drop conditions. Red Valve Control Valves are often specified for liquid-level control and for flow-control applications requiring constant gain.



The Red Valve Pinch Valve Standard Sleeve is manufactured to high technical standards. It is available in a variety of elastomers and is reinforced with high-strength fabric. Red Valve Pinch Valve Sleeves outlast conventional metal valve designs because of the unmatched abrasion resistance of our tough elastomers. The sleeve is the heart of every control valve, acting as a flow rate adjustable pipe.

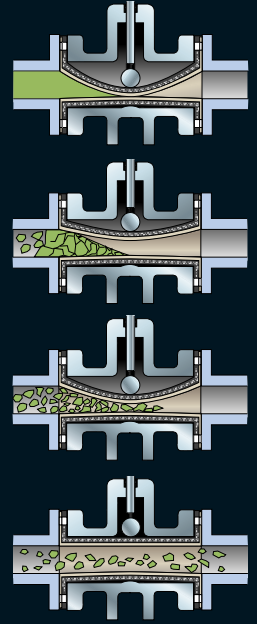


The Cone Sleeve trim creates a pressure drop designed to match the flow rate of the application. In most applications, Red Valve recommends a Cone Sleeve for throttling control. The additional rubber on the downstream side of the cone sleeve increases its service life while minimizing recovery inside the sleeve.

Comparison of Pinch Valve Sleeve Trims		
	3" FULL-PORT SLEEVE	3" X 2" CONE SLEEVE
100% $C_v$	565	152
Minimum Controllable $C_v$	74	8
$F_L$ at Min. $C_v$	.41	.86
Rangeability	8:1	19:1

## RED VALVES SELF-CLEAN:

The pinch valve sleeve's flexing action breaks away any solid or dewatered slurry buildup. The full round port sleeve has no pockets for slurry to plug or erode.



Self-cleaning design breaks up even dewatered lime.

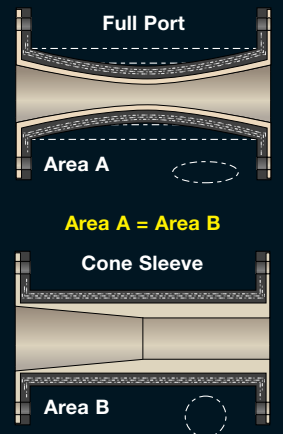
## CONE SLEEVE ADVANTAGES

Cone Sleeve trim provides tighter control with a 20:1 turndown ratio and 0.89 recovery factor. Pressure recovery occurs downstream of the sleeve, so cone sleeves can handle a higher pressure drop than other sleeve designs.



## SOLIDS HANDLING

For the same open area, the configuration of the cone sleeve allows larger solids to pass.



# Series 5200

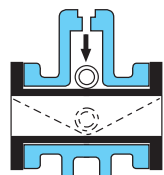
- ▶ High cycle life, repeatable control
- ▶ Sleeve is the only component in contact with the media, eliminating the need for expensive bodies
- ▶ Versatile choice of sleeve trim to meet exact flow requirements
- ▶ External stroke adjustment
- ▶ Bi-directional, drop-tight shutoff



6

## Materials of Construction

- ▶ Ductile iron body
- ▶ ATO/ATC, ATO/Fail Close and ATC/Fail Open actuators
- ▶ Sleeves available in Pure Gum Rubber, Neoprene, Hypalon®, Chlorobutyl, Buna-N, EPDM and Viton®
- ▶ Drilled and tapped to mate with ANSI B16.5 Class 150 flanges

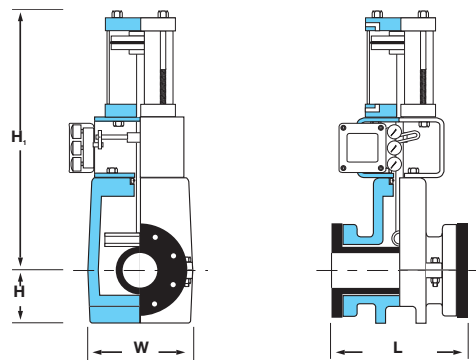


Closing Action

The Red Valve Series 5200 Control Valve design offers maximum durability with precise control and virtually eliminates maintenance. The Series 5200 is available in sizes up to four inches. A heavy-duty, rugged pinch mechanism positions the sleeve for accurate flow control. The valve has no packing to maintain or seats to wear, eliminating fugitive emissions and the need for expensive body alloys.

The standard Series 5200 Control Pinch Valve is designed with a stroke adjustment that is located inside the valve yoke. The stroke adjustment allows customers to easily make small control changes in the field and simplifies actuator maintenance by creating a removal point in the valve stem. Particularly in slurry applications, the stroke adjustment allows for fine-tuned flow control as the sleeve wears.

Cone sleeves can be specified to further enhance control performance and match the exact  $C_v$  level desired. True feedback positioning is accomplished through the direct linkage of the positioner to the valve stem shaft. There is no splitting of the positioner output. The benefits of true feedback positioning on Red Valve's Series 5200 valves are accurate small-change response signals to the positioner, causing similar changes in true valve position, greatly enhancing control accuracy.



## Dimensions Series 5200 Control Valve

VALVE SIZE	LENGTH L	WIDTH W	HEIGHT		WORKING PRESSURE psi**	WEIGHT ATO/ATC lbs*
			H	ATO/ATC H,*		
1"	7-1/4"	6"	2-7/16"	19"	150	50
1-1/2"	8-3/4"	8"	2-3/4"	19"	150	95
2"	10"	8"	3-1/2"	22"	150	125
2-1/2"	10-7/8"	9"	4"	24"	150	150
3"	11-3/4"	11-1/2"	4-1/4"	26"	150	185
4"	13-7/8"	13-1/2"	6-5/8"	29"	150	225

\*Consult factory for specific heights and weights of Fail-Close or Fail-Open valves.

\*\*Higher working pressures available.



# Series 5200 D-Port

- ▶ Large-diameter control valve provides immediate control response
- ▶ Accurate, repeatable linear flow control
- ▶ Sleeve is the only component in contact with the media, eliminating the need for expensive bodies
- ▶ Sleeve trim options match flow needs

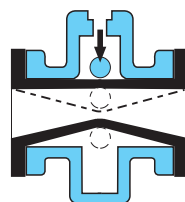


Red Valve's Series 5200 D-Port Control Valve is an economical control valve choice. When fully open, the D-Port valve chamber has an elliptical shape, with approximately 80 percent of the area and 95 percent of the flow of a full-ported valve. Flow control begins almost immediately, providing a near-linear flow characteristic. The D-Port configuration employs a single actuator that closes from the top. This design shortens the actuator stroke and thrust, which in turn reduces operating costs.

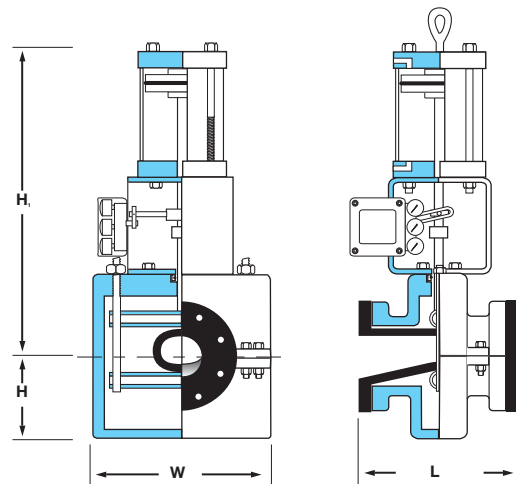
The rugged elastomer sleeve is self-cleaning, with no packing to maintain, and provides accurate, repeatable control. The Series 5200 D-Port Control Valve can be furnished with a Standard, Double-Wall or Cone Sleeve design.

## Materials of Construction

- ▶ Ductile iron body
- ▶ ATO/ATC, ATO/Fail Close and ATC/Fail Open actuators
- ▶ Sleeves available in Pure Gum Rubber, Neoprene, Hypalon®, Chlorobutyl, Buna-N, EPDM and Viton®
- ▶ Drilled and tapped to mate with ANSI B16.5 Class 150 flanges



Closing Action



7

## Dimensions Series 5200 D-Port

VALVE SIZE	LENGTH L	WIDTH W	HEIGHT		WORKING PRESSURE psi**	WEIGHT ATO/ATC lbs*
			H	ATO/ATC H,*		
6"	17-3/4"	16-7/8"	7-5/8"	36"	150	305
8"	21-3/8"	19-7/8"	9-1/8"	43"	125	395
10"	26-1/2"	23-1/2"	11"	43"	100	520
12"	29"	27-1/2"	11-13/16"	46"	100	709
14"	28"	31"	14"	51"	75	1,200
16"	32"	34"	15"	56"	50	1,600
18"	36"	44"	16-1/2"	59"	50	2,000
20"	40"	40"	17"	62"	50	2,450
24"	48"	57"	20-1/2"	69"	50	4,250
30"	60"	78"	19-3/8"	74"	50	8,300
36"	72"	90"	33"	96"	45	14,300

\*Consult factory for specific heights and weights of Fail-Close or Fail-Open valves.

\*\*Higher working pressures available.

For larger valve sizes up to 72", consult factory.

# Series 5200E Electrically Actuated

- ▶ Electric actuation provides precise, accurate control
- ▶ Sleeve is the only wetted part, so breakaway torques remain constant
- ▶ Bi-directional, drop-tight shutoff
- ▶ Enclosed rising stem design

The Series 5200E Electrically Actuated Control Valve is a reliable, maintenance-free, cost-effective valve, designed for tough slurry and abrasive applications. There are no seats to grind, no stuffing boxes to repack and no packing glands to adjust, ever. The rugged, self-cleaning, elastomer sleeve isolates all mechanical parts of the valve, so the breakaway torque remains constant.

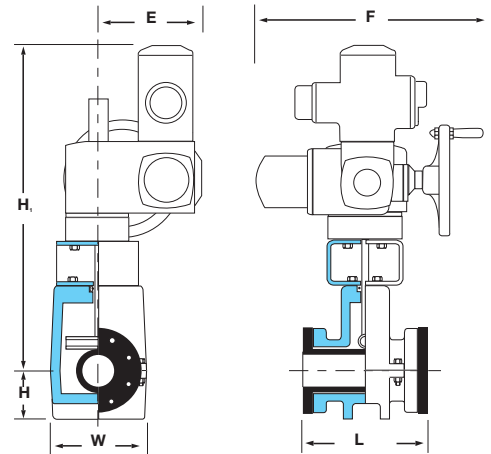
Red Valve Series 5200E Electrically Actuated Control Valves are actuated by AUMA, Limitorque or Rotork electric operators as a standard. Other electric motor operators are available upon request. Declutch and override components are furnished as standard. Controls can be furnished as an integral part of the electric operator or as a separate unit for a remote station. Standard features: heaters, thermostats and position indicators. Optional features: NEMA 7 explosion-proof construction, indication lights and proportioning control from a 4-20 mA instrument signal.



8

## Materials of Construction

- ▶ Ductile iron body
- ▶ AUMA, Limitorque or Rotork electric actuators
- ▶ Sleeves available in Pure Gum Rubber, Neoprene, Hypalon®, Chlorobutyl, Buna-N, EPDM and Viton®
- ▶ Drilled and tapped to mate with ANSI B16.5 Class 150 flanges



## Dimensions Series 5200E Electrically Actuated – Modulating Actuator

VALVE SIZE*	LENGTH L	WIDTH W	HEIGHT		ACTUATOR WIDTH E**	ACTUATOR LENGTH F**	WORKING PRESSURE psi	WEIGHT lbs
			H	H <sub>i</sub>				
1"	7-1/4"	6"	2-7/16"	28-1/8"	9-1/3"	19-1/2"	150	87
1-1/2"	8-3/4"	8"	2-3/4"	28-1/4"	9-1/3"	19-1/2"	150	131
2"	10"	8"	3-1/2"	28-3/8"	9-1/3"	20-3/8"	150	164
2-1/2"	10-7/8"	9"	4"	29-5/8"	9-3/4"	21-1/8"	150	207
3"	11-3/4"	11-1/2"	4-1/4"	30-13/16"	9-3/4"	21-1/8"	150	240
4"	13-7/8"	13-1/2"	6-5/8"	34-1/8"	11-1/4"	27-3/4"	150	356
6"	17-3/4"	16-7/8"	7-5/8"	35-1/8"	11-1/4"	28"	150	443
8"	21-3/8"	19-7/8"	9-1/8"	37-7/8"	12-1/8"	33-7/8"	125	675
10"	26-1/2"	23-1/2"	11"	39-13/16"	12-1/8"	33-7/8"	100	810
12"	29"	27-1/2"	11-13/16"	40-5/8"	12-1/8"	33-7/8"	100	999
14"	28"	31"	14"	42-13/16"	12-1/8"	33-7/8"	75	1,490
16"	32"	34"	15"	43-13/16"	12-1/8"	33-7/8"	50	1,890
18"	36"	44"	16-1/2"	46-1/4"	14-7/16"	36-7/16"	50	2,630
20"	40"	40"	17"	46-13/16"	14-7/16"	36-7/16"	50	3,180
24"	48"	57"	20-1/2"	74-1/4"	15-13/16"	41"	50	3,845
30"	60"	78"	20-1/2"	57"	19-1/8"	51"	50	6,930

\*Sizes over 4" are D-Port design.

\*\*Dimensions are based on AUMA and are for reference only. Contact factory for exact dimensions.

For larger sizes up to 72", consult factory.

## Standard features of Red Valve Series 5200E Electrically Actuated Control Valve Actuators

### Series 5200E Modulating Electric Actuator

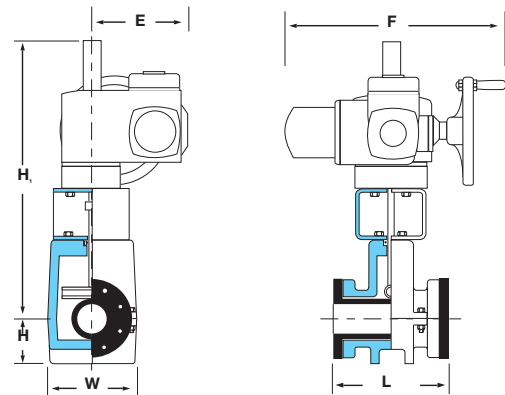
Bronze Operating Nut  
 NEMA 4 Enclosure  
 Class F Insulation  
 2 Gear Train Limit Switches  
 2 Torque Switches  
 Manual Handwheel Override  
 AUMA Matic C  
 Reversing Starters  
 Transformer  
 Three Push-Button Control Switches (O/S/C)  
 Selector Switch (L/O/R)  
 AUMATROL 601 Positioner  
 4-20 mA DC Input  
 Mechanical Dial Position Indicator (MDPI)

### Series 5200E On/Off Electric Actuator

Bronze Operating Nut  
 NEMA 4 Enclosure  
 Class F Insulation  
 2 Gear Train Limit Switches  
 2 Torque Switches  
 Manual Handwheel Override  
 Basic Compact  
 Reversing Starters  
 Transformer  
 Three Push-Button Control Switches (O/S/C)  
 Selector Switch (L/O/R)  
 Mechanical Dial Position Indicator (MDPI)

### Optional Extras

Precision Potentiometer  
 Electronic Position Transmitter Type RWG  
 Inductive Position Transmitter Type IWG (LVDT)



## Dimensions Series 5200E Electrically Actuated – On/Off Actuator

VALVE SIZE*	LENGTH L	WIDTH W	HEIGHT		ACTUATOR WIDTH E	ACTUATOR LENGTH F	WORKING PRESSURE psi	VALVE WEIGHT lbs
			H	H <sub>1</sub>				
1"	7-1/4"	6"	2-7/16"	21-13/16"	9-1/3"	19-1/2"	150	87
1-1/2"	8-3/4"	8"	2-3/4"	21-3/4"	9-1/3"	19-1/2"	150	131
2"	10"	8"	3-1/2"	22-1/2"	9-1/3"	20-3/8"	150	164
2-1/2"	10-7/8"	9"	4"	23-1/4"	9-3/4"	21-1/8"	150	207
3"	11-3/4"	11-1/2"	4-1/4"	24-1/2"	9-3/4"	21-1/8"	150	240
4"	13-7/8"	13-1/2"	6-5/8"	26-5/8"	11-1/4"	27-3/4"	150	356
6"	17-3/4"	16-7/8"	7-5/8"	28-1/2"	11-1/4"	28"	150	443
8"	21-3/8"	19-7/8"	9-1/8"	33-1/4"	12-1/8"	33-7/8"	125	675
10"	26-1/2"	23-1/2"	11"	35-1/4"	12-1/8"	33-7/8"	100	810
12"	29"	27-1/2"	11-13/16"	35-13/16"	12-1/8"	33-7/8"	100	999
14"	28"	31"	14"	38-1/4"	12-1/8"	33-7/8"	75	1,490
16"	32"	34"	15"	39-1/4"	12-1/8"	33-7/8"	50	1,890
18"	36"	44"	16-1/2"	46-1/4"	14-7/16"	36-7/16"	50	2,630
20"	40"	40"	17"	46-13/16"	14-7/16"	36-7/16"	50	3,180
24"	48"	57"	20-1/2"	74-1/4"	15-13/16"	41"	50	3,845
30"	60"	78"	19-3/8"	57-1/2"	22-7/16"	62-3/8"	50	6,930

\*Sizes over 4" are D-Port design.

For larger sizes up to 72", consult factory.

# Series 5200 Diaphragm Actuated

- ▶ Precise, responsive control
- ▶ Sleeve is the only component in contact with the media, eliminating the need for expensive bodies
- ▶ Versatile choice of sleeve trim to meet exact flow requirements
- ▶ External stroke adjustment



10

## Materials of Construction

- ▶ Ductile iron body
- ▶ Sleeves available in Pure Gum Rubber, Neoprene, Hypalon®, Chlorobutyl, Buna-N, EPDM and Viton®
- ▶ Drilled and tapped to mate with ANSI B16.5 Class 150 flanges

Red Valve's Series 5200 Diaphragm-Actuated Control Pinch Valve is available for customers who prefer diaphragm actuators.

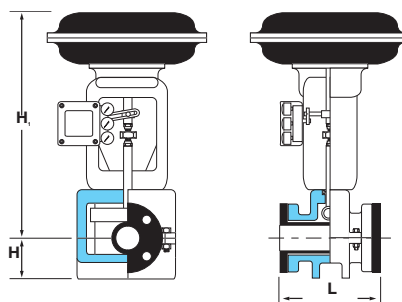
Most significant is the valve's ability to control in small-diameter applications. A diaphragm actuator offers a more responsive relationship between travel and air pressure since there is less friction and hysteresis than with piston actuators. This results in more accurate response to the instrument signal and tighter control of the process fluid.

The Series 5200 Diaphragm-Actuated Control Pinch Valve is designed with a heavy-duty, one-piece yoke. This permits a wide array of accessories to be mounted directly and easily to the top works. The Series 5200 Diaphragm-Actuated Control Valve is available in stroke sizes up to 3". For example, a 6" Control Valve with a 6" x 3" Cone Sleeve trim has 3" of stroke. A direct mount or short yoke design is available to reduce overall valve height.

The simple construction of the diaphragm actuator makes it a highly cost-effective control valve.

## Available Options:

- ▶ 4–20 mA 3–15 psi, 6–30 psi, 9–45 psi instrument signal to the positioner to control plant air
- ▶ Double-acting or spring return
- ▶ Fail position field reversible on spring-return actuators



## Dimensions Series 5200 Diaphragm-Actuated Control Valve

VALVE SIZE	LENGTH L	HEIGHT		WEIGHT lbs
		H	H <sub>1</sub>	
1"	7-1/4"	2-7/16"	23-1/2"	58
1-1/2"	8-3/4"	2-3/4"	28-1/4"	109
2"	10"	3-1/2"	28-3/4"	144
2-1/2"	10-7/8"	4"	38-3/8"	173
3"	11-3/4"	4-1/4"	38-5/8"	213

# Series 5400

- ▶ Heavy-duty valve design actuator closes on centerline
- ▶ No packing to maintain, ever
- ▶ Accurate, repeatable control
- ▶ Ideal for corrosive and abrasive slurries
- ▶ True feedback positioning



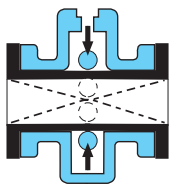
Red Valve's Series 5400 Control Pinch Valve features centerline valve closure, true feedback positioning, compact size, enclosed mechanical parts and accurate, repeatable variable venturi flow control.

Centerline closure is extremely important for larger size pinch on abrasive and high velocity applications. Centerline closure outlasts all other types of gate, plug or ball valves on control of abrasive and corrosive slurries. The resilient elastomer sleeve outlasts even stellite-coated control valves.

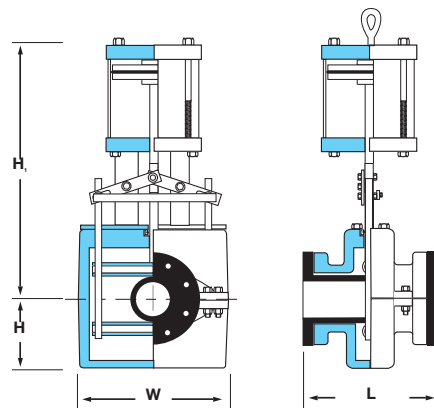
Cone Sleeves can be specified to further enhance control performance and match the exact  $C_v$  level desired. True feedback positioning is accomplished through the direct linkage of the pneumatic positioner to the valve stem shaft. The benefits of true feedback positioning on Red Valve Series 5400s include accurate small responsive signal changes to the positioner, causing similar changes in true valve position, greatly enhancing control accuracy and repeatability.

## Materials of Construction

- ▶ Ductile iron body
- ▶ Sleeves available in Pure Gum Rubber, Neoprene, Hypalon®, Chlorobutyl, Buna-N, EPDM and Viton®
- ▶ ATO/ATC, ATO/Fail Close, ATC/Fail Open hydraulic or electric actuators
- ▶ Drilled and tapped to mate with ANSI B16.5 Class 150 flanges



Closing Action



## Dimensions Series 5400

VALVE SIZE	LENGTH L	WIDTH W	HEIGHT		WORKING PRESSURE psi**	WEIGHT ATO/ATC lbs*
			H	ATO/ATC H,*		
4"	9"	10-1/2"	5-3/4"	26-1/2"	150	210
5"	10"	15-3/8"	8-1/2"	32"	150	250
6"	10-1/2"	18-1/4"	7-7/8"	32-1/8"	150	288
8"	16"	23-1/4"	9-1/8"	32-1/2"	150	385
10"	20"	29-3/4"	10-1/2"	43"	150	520
12"	24"	35"	11-1/2"	46"	150	709
14"	28"	37-1/2"	14-1/2"	51-3/4"	150	1,200
16"	32"	41-1/2"	15-1/2"	56-1/2"	150	1,600
18"	36"	51"	17"	59-1/2"	150	2,000
20"	40"	47-3/4"	17-3/4"	62-3/4"	150	2,450
24"	48"	57"	25-1/2"	***69"	150	4,200
30"	60"	78"	20-1/2"	***74"	50	8,300
36"	72"	77"	32"	***96"	45	14,300

\*Consult factory for specific heights and weights of Fail-Close or Fail-Open valves.

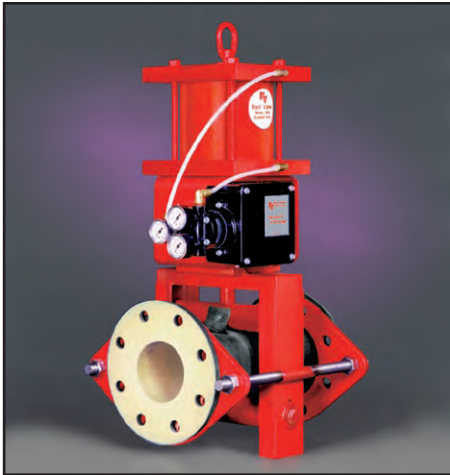
\*\*Higher working pressures available.

\*\*\*Hydraulic or electric only.

For larger sizes up to 72", consult factory.

# Series 5300 Open Frame

- ▶ Cost-effective, open-frame control valve design
- ▶ Lightweight
- ▶ High cycle life, repeatable control
- ▶ Sleeve is the only wetted part
- ▶ No packing to maintain, ever



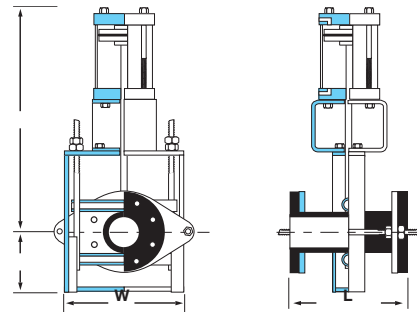
The Series 5300 features many of the same advantages of the Series 5200 in a lightweight, low-cost, open-frame design. The open-frame design is possible because the sleeve is the only wetted part of the Pinch Valve, protecting the operating mechanism and frame from corrosive or abrasive attack from the line process. A heavy-duty, rugged pinch mechanism pinches the sleeve, resulting in accurate flow control. The Series 5300 has no packing to maintain or seats to wear and is well suited for handling corrosives, powders and slurry materials.

Pneumatic, electric or hydraulic actuators are available, complete with pneumatic or electropneumatic positioners. The Series 5300 Control Pinch Valve is designed with a stroke adjustment that is located inside the valve yoke in valve sizes up to 6". The stroke adjustment unit allows customers to easily make small control changes in the field and simplifies actuator maintenance by creating a removal point in the valve stem. Particularly in slurry applications, the stroke adjustment unit allows for fine-tuned flow control as the sleeve wears. Due to the fabricated open-frame design of the Series 5300, slight variations in face-to-face length can be accommodated.

12

## Materials of Construction

- ▶ Carbon steel frame; stainless steel optional
- ▶ Sleeves available in Pure Gum Rubber, Neoprene, Hypalon®, Chlorobutyl, Buna-N, EPDM and Viton®
- ▶ Pneumatic, hydraulic or electric actuators
- ▶ Drilled and tapped to mate with ANSI B16.5 Class 150 Flanges; DIN, ASA or BS standards optional



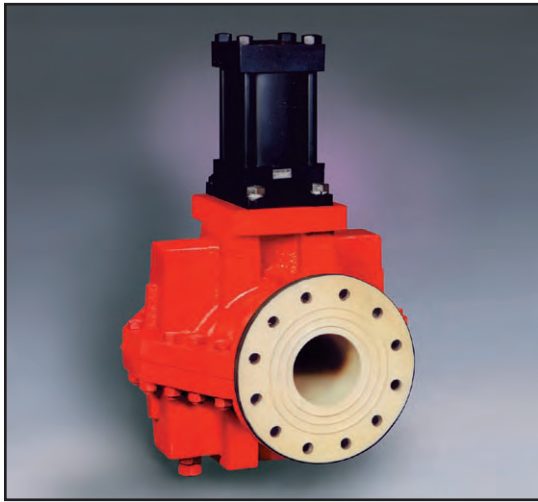
## Dimensions Series 5300 Open-Frame Control Valve

VALVE SIZE	LENGTH L	WIDTH W	HEIGHT		WORKING PRESSURE psi	WEIGHT ATO/ATC lbs*
			H	ATO/ATC H*		
2"	10"	8"	3-1/2"	22"	150	63
2-1/2"	10-7/8"	9"	4"	24"	150	75
3"	11-3/4"	11-1/2"	4-1/4"	26"	150	93
4"	13-7/8"	13-1/2"	6-5/8"	29"	150	113
6"	17-3/4"	16-7/8"	7-5/8"	36"	150	153
8"	24"	19-7/8"	9-1/8"	43"	125	198
10"	30"	23-1/2"	11"	43"	100	260
12"	36"	27-1/2"	11-13/16"	46"	100	355
14"	42"	31"	14"	51"	75	600
16"	48"	34"	15"	56"	50	800
18"	54"	44"	16-1/2"	59"	50	1,000
20"	60"	40"	17"	62"	50	1,225
24"	72"	52"	23"	81-1/2"	50	2,100
30"	90"	74"	30"	102"	50	4,100
36"	108"	84"	36"	122"	45	7,100

\*Consult factory for specific heights and weights of Fail-Close or Fail-Open valves. For larger sizes up to 72", consult factory.

# Series 9000 High

- ▶ Working pressures up to 720 psi
- ▶ High-pressure pinch valve design for on/off applications
- ▶ Heavy-duty polyester or Kevlar®-reinforced high-pressure sleeve is the only wetted part
- ▶ Extended service life
- ▶ Sealed body design



The Series 9000 High-Pressure Control Pinch Valve is Red Valve's ANSI Class 300 pinch valve product. With Red Valve's Double-Wall Sleeve, the valve features increased abrasion resistance and can accommodate pressures up to 720 psi. The Series 9000 is also available with Red Valve's patented Cone Sleeve for control applications and the Standard Sleeve for lower pressure requirements.

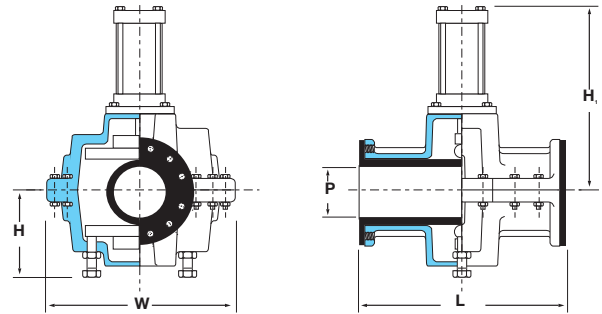
A heavy-duty solid steel stroke adjustment unit located on the base of the Series 9000 allows the user to fine-tune control or adjust stroke for sleeve wear due to abrasion, reducing system downtime.

The Series 9000 is available with various actuators: bevel gear actuators for manual operation, hydraulic or electric actuators for automatic operation and pneumatic actuators for small or low-pressure applications.

For applications with low pressure requirements, the Series 9000 is also available in ANSI Class 150 drilling configurations.

## Materials of Construction

- ▶ Ductile iron, 316 stainless steel bodies
- ▶ Sleeves available in Pure Gum Rubber, Neoprene, Hypalon®, Chlorobutyl, Buna-N, EPDM and Viton®
- ▶ Bevel Gear 4:1, 8:1, 16:1 actuator, electric actuator or hydraulic actuator
- ▶ Drilled and tapped to mate with ANSI B16.5 Class 300 flanges, ANSI B16.1 Class 250 flanges, optional Class 150 flanges



## Dimensions Series 9000

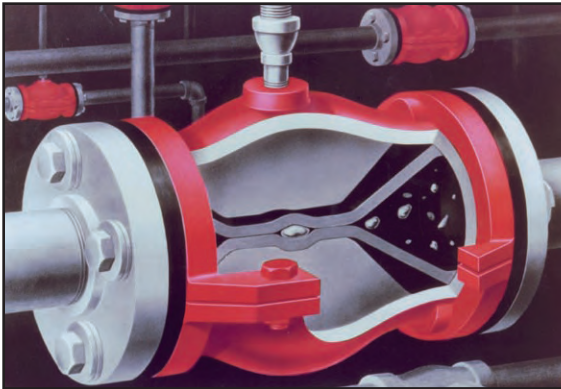
VALVE SIZE	FULL - PORT SLEEVE		DOUBLE - WALL SLEEVE		LENGTH L	WIDTH W	HEIGHT		WEIGHT lbs
	PORT SIZE P	MAX WORKING PRESSURE AT 100°F psi*	PORT SIZE P	MAX WORKING PRESSURE AT 100°F psi*			H	H <sub>1</sub> **	
1"	1"	720	1/2"	720	7-3/4"	12"	6"	16"	73
2"	2"	335	1-1/2"	720	9-1/2"	16"	8"	22"	229
3"	3"	240	2"	720	10-3/4"	17"	9"	26"	335
4"	4"	185	3"	720	14"	20"	11"	28"	438
6"	6"	245	4"	720	20"	23"	13"	33"	600
8"	8"	250	6"	720	26"	25"	15"	39"	802
10"	10"	200	8"	720	32-1/2"	33"	20"	51"	1,083
12"	12"	175	10"	720	38-1/2"	40"	25"	62"	1,477
14"	14"	320	12"	720	45"	45"	28"	68"	2,350
16"	16"	360	14"	720	51"	51"	31"	74"	3,500
18"	18"	265	16"	720	57-1/2"	56"	34"	80"	5,000
20"	20"	240	18"	720	64"	62"	37"	87"	6,850
24"	24"	250	20"	720	77"	71"	40"	100"	11,800
26"	26"	150	24"	720	83"	77"	43"	108"	15,000

\*Higher working pressures available.

\*\*With hydraulic cylinder.

# Type A

- ▶ Non-critical flow control valve
- ▶ Body acts as a built-in actuator
- ▶ Sealing area is 60 percent of valve length
- ▶ No packing to maintain or replace
- ▶ Cost effective, maintenance free



The Type A Control Valve is designed for economical open-loop control in non-critical, low-pressure-drop applications. Red Valve Type A Control Pinch Valves are used extensively for slurry control. Over 2,000,000 Type A Pinch Valves have been sold.

Actuation of the valve, the pinching action, is accomplished by air or hydraulic pressure placed on the sleeve. The valve body acts as a built-in actuator, eliminating the need for pneumatic, hydraulic or electric actuators. Varying the pressure within the annular space between the body and the sleeve can open, throttle or close the valve. Approximately 35 psi over line pressure is required for closure.

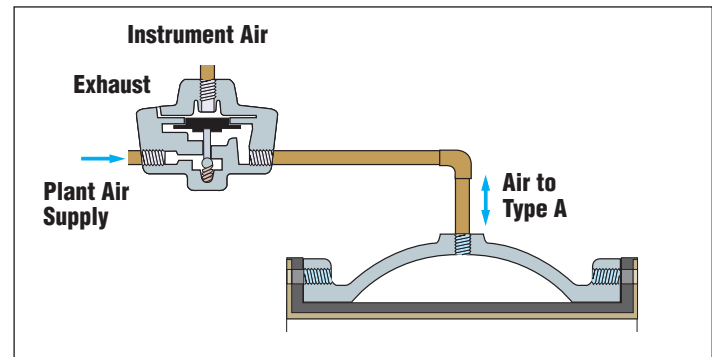
Throttling control is accomplished by a changing air signal to a proportional relay which modulates air pressure to the Type A Control Pinch Valve. Pressure drop should generally not exceed 30 percent across the Type A Valve.

14

## Materials of Construction

- ▶ Cast iron or aluminum bodies
- ▶ Sleeves available in Pure Gum Rubber, Neoprene, Hypalon®, Chlorobutyl, Buna-N, EPDM and Viton®
- ▶ Drilled and tapped to mate with ANSI B16.5 Class 150 or 300 Flanges

## Controlling a Type A with a Proportional Relay



Red Valve recommends an adjustable relay (as opposed to a fixed, proportional relay).

## Dimensions Type A Pinch Valve, Standard Sleeve Trim

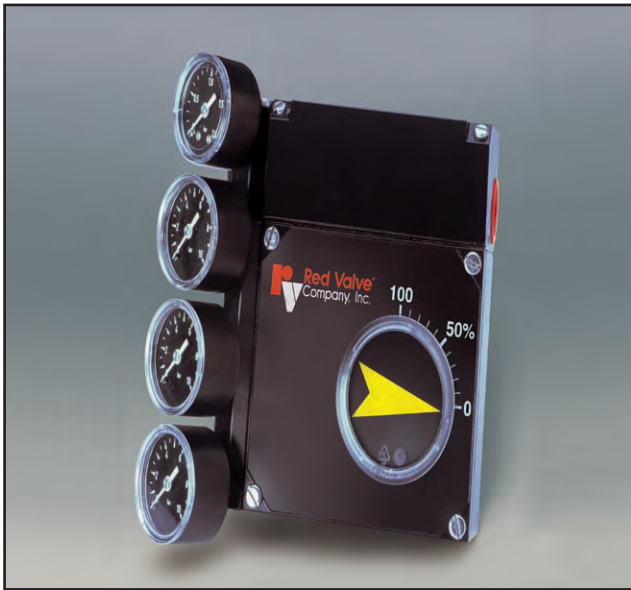
VALVE SIZE	LENGTH L	HEIGHT H	WORKING PRESSURE psi	WEIGHT CAST IRON lbs	VOLUME ft <sup>3</sup>	AIR INLET NPT
1/2"	3"	3-1/2"	150	5	.002	1/4"
3/4"	4"	3-3/4"	150	7	.002	1/4"
1"	5"	4-1/4"	150	9	.002	1/4"
1-1/2"	7"	5"	150	17	.007	1/4"
2"	9"	6-1/2"	150	32	.016	1/4"
2-1/2"	10"	7"	150	40	.028	1/4"
3"	12"	8"	150	55	.049	1/4"
4"	12-1/2"	10-5/8"	150	85	.091	1/4"
5"	16-1/2"	11-1/2"	150	119	.187	1/4"
6"	20"	13"	150	166	.327	1/4"
8"	22"	16-1/4"	125	235	.640	1/4"
10"	24"	21"	100	425	1.09	1/4"
12"	26"	24"	100	640	1.70	1/4"
14"	30"	22"	75	780	2.39	1/4"
16"	34"	29-1/2"	75	910	3.59	1/4"
18"	39"	30-1/2"	50	1,275	5.27	3/4"
*20" x 24"	43"	31"	50	1,704	7.25	1"
*24" x 28"	51"	38-1/2"	50	2,100	12.5	1"

\*Valve uses extended flange.  
For larger sizes up to 72", consult factory.



# Positioners

- ▶ Sturdy, simple, reliable design
- ▶ High gain pilot valve
- ▶ Bright visible indicator
- ▶ Stainless steel cam
- ▶ Tapped exhaust port
- ▶ Easy-to-add feedback unit
- ▶ Simple calibration, external zero adjustment
- ▶ Built-in gauge ports



## Materials of Construction

- ▶ Die-cast aluminum body with black epoxy finish
- ▶ Stainless steel fasteners
- ▶ NEMA 4/IP66 ingress protection

Red Valve Company offers simplified pneumatic and electropneumatic positioners to meet the increasing need for complete automation.

## Pneumatic Positioner

The foundation of the Red Valve Company valve control system is the P5 Pneumatic Positioner. Performance of this unit has been enhanced with the special high gain/high capacity spool valve assembly providing very quick and accurate actuator/valve response. For single or double acting applications, this new modular design allows for the simple addition of I/P converters and/or a feedback unit with a variety of feedback options.

Other features include: gauge ports, stainless steel cam with a simple cam locking device, tapped exhaust port for venting supply media, external zero adjustment and completely sealed cover.

## Electropneumatic Positioner

The Red Valve EP5 Electropneumatic Positioner is adapted from the P5. This compact and sturdy unit is designed for maximum performance in all types of environments. The EP5 is available in standard, intrinsically safe and explosion-proof designs. A modular feedback unit F5 allows for the addition of limit switches and/or position transmitters without additional mounting brackets.

Other features include: replaceable filter, gauge ports, dampers, tapped exhaust port for venting of supply media, external zero adjustment and completely sealed cover.

## Options

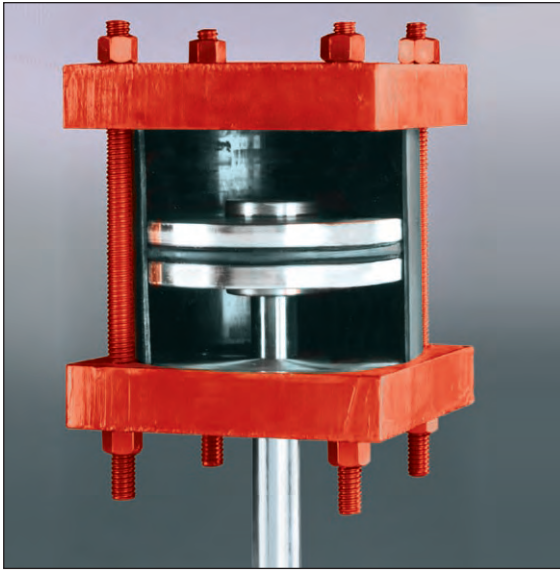
These positioners can be fitted with an array of control options, such as gauges, disk or dome type indicators, mechanical switches and proximity switches. A simple, trouble-free modular design allows these positioners to be upgraded to meet any process control system requirement.

## Specifications

Function	P5 Pneumatic	EP5 Electropneumatic
Input Signal	3-15 or 6-30 psi	4-20 mA
Linearity	≤0.5%	≤0.75%
Hysteresis	≤0.75%	≤1.0%
Repeatability	≤0.5%	≤0.5%
Supply Pressure	Max. 145 psi	Max. 145 psi
Air Consumption @ 80 psi Supply Pressure	0.64 scfm	0.64 scfm
Air Delivery @ 80 psi Supply Pressure	17.3 scfm	17.3 scfm
Supply Pressure Effect	—	0.5% (15 psi)
Input Resistance	—	260 Ohms @ 71°F (20°C)
RFI Influence	—	Not measurable
Capacitance	—	Negligible
Position Sensitivity	—	None
Connections	1/4" NPT	1/4" NPT Supply, 1/2" NPT Electrical
Gauge Threads	1/8" NPT	1/8" NPT
Temperature Range	-4°F to 185°F/-20°C to +85°C	-4°F to 185°F/-20°C to 85°C
Weight	2.4 lbs	3.4 lbs

# Actuators

- ▶ Self-lubricating for high cycle life
- ▶ Impact and dent resistant
- ▶ Resistant to chemical attack for a variety of processes
- ▶ Double-acting or single-acting spring return



## Materials of Construction

- ▶ Black Amalga cylinder tube
- ▶ Neoprene O-ring seal
- ▶ 304 stainless steel piston rod
- ▶ Polypak or Buna-N wiper ring
- ▶ SAE grade 5 carbon steel threaded tie rods
- ▶ Stainless steel fastening nuts
- ▶ T6061 aluminum cylinder heads and piston

Red Valve actuators are manufactured with lightweight Black Amalga tubing, which is fiberglass-reinforced epoxy. The actuator material is impregnated with an anti-friction additive to reduce the piston and O-ring to cylinder friction. The actuator is self-lubricating, and the inside of the cylinder is honed to a 5-15 micro inch finish. The combination of the surface finish and the self-lubricating feature greatly increase the O-ring life.

The Black Amalga is resistant to chemical attack and corrosion, making it ideal for most environments. It has an impact strength of 40 izod ft-lbs, which makes the actuator much more dent-resistant than aluminum or brass.

Red Valve actuators have a maximum operating pressure of 150 psi and can withstand external operating temperatures of -90°F to 225°F.

Piston rods are made of polished 304 stainless steel, and the piston rod is sealed with a polyurethane lip seal. Both the piston rod and seal are protected by a wiper ring that cleans the piston rod before it passes through the lip seal. The rod seal and wiper ring are held in place by a bronze stem bushing, which prevents galling of the piston rod. The combination of a stainless steel piston rod, wiper ring and lip seal contribute to extended actuator life.

## Double-Acting Actuator

ATO/ATC R style actuators are used on Series 5200, 5200 D-Port, 5400 and 5300 Open-Frame Control Valves. These actuators use air to open and close the valve.

## Single-Acting Actuator

ATO/FCS and ATC/FOS RS style actuators consist of either a fail-close spring, which is preloaded to provide enough force to close and seal the sleeve upon air loss, or a fail-open spring, which drives the valve open upon air loss. Fail-open spring actuators are used primarily in low pressure or partial vacuum services, where the line pressure is not sufficient to fully open the valve.

Standard tubing is polyethylene; optional tubing includes copper, PVC-coated copper and stainless steel.

# Accessories

## Manual Override

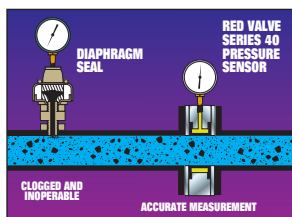
The manual override actuator option is available on all Red Valve pneumatically actuated control valves. The unit consists of a handwheel or bevel gear actuator with a stem extension, an override yoke, a position indicator and a removable override engagement pin.



In normal operation, the manual override is disengaged. It is engaged when the valve cannot be operated automatically by the pneumatic actuator, for instance, if the plant air supply is shut down or the instrument air signal to a positioner is cut off. The manual override is available only as a factory-installed option; it cannot be retrofitted in the field.

## Pressure Sensors

Red Valve pressure sensors are the industry standard for protecting instrumentation and assuring accurate, dependable pressure measurement of slurry and corrosive fluids. Line pressure is sensed 360° through the flexible rubber sleeve. All instruments are isolated and protected from the process, assuring positive and accurate readings. Numerous styles of pressure gauges, transmitters and pressure switches are available.



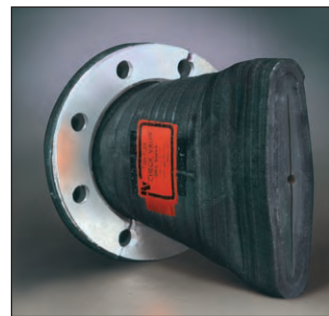
## "Smart" Sleeves

The Red Valve Smart Sleeve uses a unique construction to electronically sense when the sleeve has worn to the point where it needs to be replaced. An associated alarm module monitors the condition of the sleeve and provides visual indication of sleeve status. The process fluid must be an electrical conductor for proper operation. Water, water-based slurries and many other liquids are suitable conductors.



## Series TFO Flow Restrictor

The TFO Flow Restrictor is an elastomer variable orifice that induces backpressure and is designed to help eliminate cavitation on control valves in high-pressure-drop applications. The variable flow characteristics are superior to an orifice plate restrictor and other similar devices placed in the line to restrict flow and create backpressure. The TFO is installed on the discharge end of a pipe or inline.



The pressure drop in a TFO increases in a near-linear pattern as the flow increases. This feature distinguishes the advantage of the TFO over orifice plates, where as the flow rate increases, the backpressure increases exponentially.

The TFO is available in a flanged or slip-on construction. The TFO's mounting dimensions are identical to the standard slip-on TF-2 and the Series 35 flanged check valve.

## Fugitive Emissions Control – Emissions-Tight Package

Red Valve's emissions-tight package, the ET Package, provides a low-cost solution for fugitive emissions and is available on Series 9000 body designs.



The design of the pinch valve is intrinsically safe because the sleeve isolates the flow; this acts as the primary containment. The ET Package, complete with a stem seal and a sealed body, provides a secondary containment. This assures that in the unlikely event of a sleeve rupture, the volatile organic compounds are kept within the confines of the valve body.

## Automatic Leak Detection

The ET Package also includes a standard pressure gauge for local indication or an optional transmitter or switch that will send a remote signal in the event of a pressure change in the valve body, automatically indicating the detection of a leak.

# Flow Data

## Data Required For Sizing

- ▶ Pipe diameter
- ▶ Flow **Q** Maximum in gallons per minute GPM
- ▶ Flow **Q** Minimum in gallons per minute GPM
- ▶ Flow **Q** Normal in gallons per minute GPM
- ▶ **P<sub>i</sub>** Inlet Pressure PSIG at Minimum, Maximum and Normal flow
- ▶  $\Delta P$  Pressure Drop through the valve at Minimum, Maximum and Normal Flow
- ▶ **G** Specific Gravity of fluid at operating temperatures
- ▶ **P<sub>v</sub>** Vapor Pressure, PSIA of fluid at operating temperatures

The basic equation for sizing Red Valve's Control Pinch Valves for non-compressible fluids and liquids is as follows:

$$C_v = Q \sqrt{\frac{G}{\Delta P}}$$

Where: **Q** = Flow rate in GPM

**G** = Specific Gravity

$\Delta P$  = Pressure Drop =  $P_i - P_o$

**P<sub>i</sub>** = Inlet pressure in PSIG

**P<sub>o</sub>** = Outlet pressure in PSIG

## Flow Coefficient

Valve flow coefficient indicates capacity. It is the flow in GPM of 60°F water through the valve with 1 psi pressure drop, at a stated upstream pressure.

## Leakage

Leakage references the allowable quantity of fluid passing through a valve when fully closed. This leakage rate is defined by ANSI standard B16.104.

## Flow Characteristics

Flow Characteristics of the valve refer to the relationship between the flow through the valve and the rated travel or opening, as the latter is varied from 0 to 100%.

## Rangeability

Rangeability refers to the ratio of maximum to minimum flows to be controlled.

## Differential Pressure Drop

A point of confusion regarding control valve sizing is the difference between the assigned  $\Delta P$  and the actual  $\Delta P$ .

Assigned  $\Delta P$  is actually the pressure drop added to the system resistance during design to assure that sufficient  $\Delta P$  is available to permit the control valve to perform its function. This is considered a theoretical value and has no meaning under actual operating conditions. It is needed during the design stage for tasks such as estimating pump size.

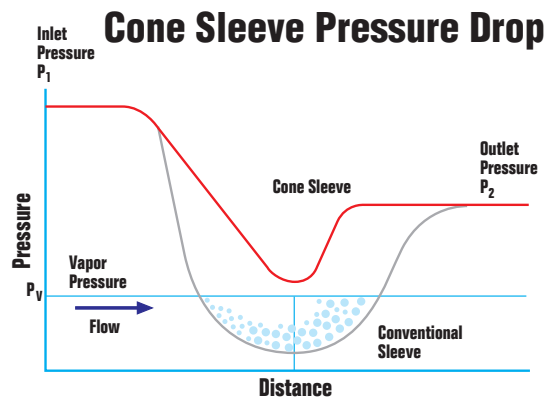
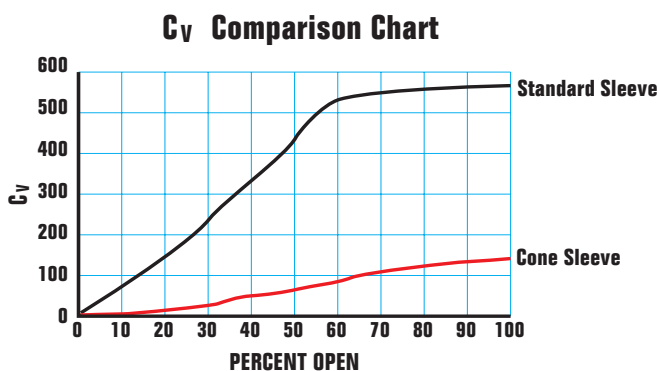
The actual  $\Delta P$  is the difference between the control valve inlet pressure and control valve outlet pressure for a given flow. A control valve does not dictate the  $\Delta P$  in a system. Rather, the fluid system dictates what the  $\Delta P$  across a control valve is for a given flow.

18

## Cone Sleeve Benefits

The Cone Sleeve maintains a smooth streamline flow pattern when modulating slurry fluids. It has a maximum allowable pressure drop of 20% to 25% higher than the standard sleeve trim. The Cone Sleeve offers a high rangeability for modulating service.

It has the highest rangeability and pressure recovery factor of all the Red Valve sleeve trims and provides accurate, repeatable control over a wide range of flow conditions.



# Control Valve Sizing

The illustration below is the mathematical calculation used in correctly sizing a Control Valve. All of the information necessary to calculate valve size is listed on the following pages. Designers can also submit a sizing request using the Control Valve Order Entry data sheet form on page 27 or online at [www.redvalve.com](http://www.redvalve.com).

Sizing of Control Pinch Valves is now made easier by using Red Valve Company's Kwiksize Control Valve Sizing Software.

## Example:

**Line Size:** 3" diameter 125# ANSI flanged  
**Flow:** 137 gallons per minute GPM max  
 125 gallons per minute GPM min  
**P:** 25 PSIG max  
 20 PSIG min  
**T:** 120°F  
**ΔP:** 12 PSI max  
 7.5 PSI min  
**G:** 1.2 Specific Gravity  
**Viscosity:** 50 SSU

Process media is lime slurry, throttling service.

► Solve for  $C_{VMAX}$ :

$$C_{VMAX} = Q_{MAX} \sqrt{\frac{G}{\Delta P}}$$

$$C_{VMAX} = 137 \sqrt{\frac{1.2}{7.5}}$$

$$C_{VMAX} = 54.8$$

► Solve for  $C_{VMIN}$ :

$$C_{VMIN} = Q_{MIN} \sqrt{\frac{G}{\Delta P}}$$

$$C_{VMIN} = 125 \sqrt{\frac{1.2}{12}}$$

$$C_{VMIN} = 39.5$$

► Select the Control Pinch Valve size.

If there is a 3" line and a 54.8  $C_{VMAX}$  and a 39.5  $C_{VMIN}$  is required for this application, review the  $C_v$  Charts to determine the appropriate sleeve trim selection. This selection dictates the valve size.

**Note:** A 3" x 1-1/2" Cone Sleeve has a maximum  $C_v$  of 58.

This would be the best selection, as maximum valve  $C_v$  equals 58. Control would be between 56% open and 80% open.

► Solve for ΔP Allowable:

$$\Delta P \text{ Allowable} = F_L^2 \times (P_i + 14.7 - rc \times P_v)$$

$\Delta P \text{ Allowable}$  = Maximum allowable pressure drop

$F_L$  = **Pressure Recovery Factor**  
(see  $C_v$  table for  $F_L$  factor)

$P_i$  = **Inlet Pressure PSIG**

14.7 = **Conversion to PSIA**

$rc$  = **Critical Pressure Ratio** (.94 constant)

$P_v$  = **Vapor Pressure at Flow Temperature**  
(see Vapor Pressure table)

$$\Delta P \text{ Allowable} = .70^2 \times (25 + 14.7 - .94 \times 1.69)$$

$$\Delta P \text{ Allowable} = 18.7 \text{ PSI}$$

**Note:** Actual Max ΔP = 12 PSI

When the Actual ΔP is smaller than the ΔP Allowable, cavitation will not occur.

► Solve for Reynold's number:

$$Re = 3160 \times \frac{Q}{d \times k}$$

$Re$  = **Reynold's Number**

$Q$  = **Flow GPM**

$d$  = **Internal Diameter** Square Inches

$k$  = **Viscosity** Centistokes

(see Viscosity Conversion table)

$$Re = 3160 \times \frac{137}{(3 \times 7.4)}$$

$$Re = 19501$$

**Note:** The Reynold's Number is much higher than 3500, no correction to the  $C_v$  is required.

Generally, if the calculated Reynold's Number is 3500 or greater, no correction to the  $C_v$  is required.

► Solve for Valve Inlet Velocity:

$$V = \frac{Q}{3.12 \times A}$$

$V$  = **Velocity**

$Q$  = **Flow GPM**

$A$  = **Valve Inlet Cross Section Area** Sq. In.

$$V = \frac{137}{(3.12 \times 7)}$$

$$V = 6.3 \text{ Feet per Second}$$

**Note:** Velocity is below 14 feet per second which is ideal. Velocity should not exceed 22 feet per second.

► Choose appropriate accessories, ie: limit switches, positioners, solenoids, etc.

# Pressure Recovery Factor – $F_L$

## Liquid Pressure Recovery Factor $F_L$

The critical flow factor  $F_L$  is a dimensionless expression of the pressure recovery ratio in a control valve.  $F_L$  is an ISA nomenclature.

$$F_L = \sqrt{\frac{P_1 - P_2}{P_1 - P_{vc}}}$$

- $F_L$  = Valve critical flow factor
- $P_1$  = Inlet pressure PSIA
- $P_2$  = Outlet pressure PSIA
- $P_{vc}$  = Pressure at Vena Contracta

### $F_L$ Cone Sleeve – Series 5200

VALVE SIZE (")	PORT SIZE (")	% OF TOTAL TRAVEL									
		10	20	30	40	50	60	70	80	90	100
1	x 1/3	.86	.86	.84	.80	.76	.70	.66	.62	.59	.56
1	x 1/2	.86	.86	.84	.80	.76	.70	.66	.62	.59	.56
1	x 3/4	.49	.49	.51	.53	.61	.63	.62	.61	.60	.60
1-1/2	x 1/2	.86	.86	.84	.80	.76	.70	.66	.62	.59	.56
1-1/2	x 1/4	.86	.86	.84	.80	.76	.70	.66	.62	.59	.56
1-1/2	x 1	.57	.57	.58	.58	.64	.64	.63	.61	.60	.59
2	x 3/4	.86	.86	.84	.80	.76	.70	.66	.62	.59	.56
2	x 1	.86	.86	.84	.80	.76	.70	.66	.62	.59	.56
2	x 1-1/2	.49	.49	.51	.53	.61	.63	.62	.61	.60	.60
2-1/2	x 1	.86	.86	.84	.80	.76	.70	.66	.62	.59	.56
2-1/2	x 1-1/2	.66	.66	.66	.65	.68	.66	.64	.62	.60	.58
2-1/2	x 2	.45	.45	.47	.50	.60	.62	.62	.61	.61	.60
3	x 1	.86	.86	.84	.80	.76	.70	.66	.62	.59	.56
3	x 1-1/2	.86	.86	.84	.80	.76	.70	.66	.62	.59	.56
3	x 2	.57	.57	.58	.58	.64	.64	.63	.61	.60	.59
4	x 1-1/2	.86	.86	.84	.80	.76	.70	.66	.62	.59	.56
4	x 2	.86	.86	.84	.80	.76	.70	.66	.62	.59	.56
4	x 3	.49	.49	.51	.53	.61	.63	.62	.61	.60	.60
6	x 3	.86	.86	.84	.80	.76	.70	.66	.62	.59	.56
6	x 4	.57	.57	.58	.58	.64	.64	.63	.61	.60	.59
6	x 5	.43	.43	.44	.47	.50	.60	.61	.62	.61	.61
8	x 4	.86	.86	.84	.80	.76	.70	.66	.62	.59	.56
8	x 5	.63	.63	.63	.63	.65	.66	.64	.62	.60	.58
8	x 6	.49	.49	.51	.53	.58	.62	.63	.62	.61	.60
10	x 5	.86	.86	.84	.80	.76	.70	.66	.62	.59	.56
10	x 6	.66	.66	.66	.65	.68	.66	.64	.62	.60	.58
10	x 8	.45	.45	.46	.49	.54	.61	.62	.62	.61	.61
12	x 6	.86	.86	.84	.80	.76	.70	.66	.62	.59	.56
12	x 8	.57	.57	.58	.58	.64	.64	.63	.61	.60	.59
12	x 10	.43	.43	.45	.47	.50	.60	.61	.62	.61	.61
14	x 8	.74	.74	.74	.72	.72	.68	.65	.62	.60	.58
14	x 10	.52	.52	.53	.54	.60	.63	.63	.62	.61	.60
14	x 12	.42	.42	.43	.44	.47	.54	.59	.61	.62	.61
16	x 8	.86	.86	.84	.80	.76	.70	.66	.62	.59	.56
16	x 12	.49	.49	.50	.52	.57	.62	.63	.62	.61	.60
16	x 14	.41	.41	.42	.45	.47	.56	.60	.61	.62	.61
18	x 12	.57	.57	.58	.58	.64	.64	.63	.61	.60	.59
18	x 14	.47	.47	.49	.50	.56	.61	.62	.62	.61	.61
18	x 16	.40	.40	.41	.44	.46	.55	.60	.61	.61	.61
20	x 14	.52	.52	.53	.55	.62	.63	.63	.61	.60	.59
20	x 16	.45	.45	.46	.49	.54	.61	.62	.62	.61	.61
20	x 18	.40	.40	.41	.43	.46	.54	.60	.61	.61	.61
24	x 16	.57	.57	.58	.58	.64	.64	.63	.61	.60	.59
24	x 18	.49	.49	.51	.53	.59	.62	.62	.62	.61	.60
24	x 20	.43	.43	.45	.47	.51	.60	.61	.62	.61	.61
30	x 18	.66	.66	.66	.65	.68	.66	.64	.62	.60	.58
30	x 20	.57	.57	.58	.58	.64	.64	.63	.61	.60	.59
30	x 24	.45	.45	.46	.49	.54	.61	.62	.62	.61	.61

For larger sizes up to 72", consult factory.

### $F_L$ Standard and Double-Wall Sleeve

		Series 5200 1/2" – 4"	Series 5200 6" – 36"	Series 5400 All Sizes
% OF TOTAL TRAVEL	10	.360	.360	.360
	20	.360	.360	.360
	30	.390	.363	.390
	40	.430	.384	.430
	50	.560	.410	.560
	60	.600	.456	.600
	70	.610	.547	.610
	80	.610	.584	.610
	90	.610	.603	.610
	100	.610	.610	.610

### $F_L$ Cone Sleeve – Series 5400

VALVE SIZE (")	PORT SIZE (")	% OF TOTAL TRAVEL									
		10	20	30	40	50	60	70	80	90	100
4	x 1-1/2	.86	.86	.84	.80	.76	.70	.66	.62	.59	.56
4	x 2	.86	.86	.84	.80	.76	.70	.66	.62	.59	.56
4	x 3	.49	.49	.51	.53	.61	.63	.62	.61	.60	.60
6	x 3	.86	.86	.84	.80	.76	.70	.66	.62	.59	.56
6	x 4	.57	.57	.58	.58	.64	.64	.63	.61	.60	.59
6	x 5	.43	.43	.46	.48	.59	.61	.62	.61	.61	.60
8	x 4	.86	.86	.84	.80	.76	.70	.66	.62	.59	.56
8	x 5	.63	.63	.63	.63	.65	.66	.64	.62	.60	.58
8	x 6	.49	.49	.51	.53	.61	.63	.62	.61	.60	.60
10	x 5	.86	.86	.84	.80	.76	.70	.66	.62	.59	.56
10	x 6	.66	.66	.66	.65	.68	.66	.64	.62	.60	.58
10	x 8	.45	.45	.47	.50	.60	.61	.62	.62	.61	.61
12	x 6	.86	.86	.84	.80	.76	.70	.66	.62	.59	.56
12	x 8	.57	.57	.58	.58	.64	.64	.63	.61	.60	.59
12	x 10	.43	.43	.46	.48	.59	.61	.62	.61	.61	.60
14	x 8	.74	.74	.74	.72	.72	.68	.65	.62	.60	.58
14	x 10	.52	.52	.53	.55	.62	.63	.63	.61	.60	.59
14	x 12	.42	.42	.44	.47	.58	.61	.62	.61	.61	.60
16	x 8	.86	.86	.84	.80	.76	.70	.66	.62	.59	.56
16	x 12	.49	.49	.51	.53	.61	.63	.62	.61	.60	.60
16	x 14	.41	.41	.44	.47	.58	.61	.62	.61	.61	.60
18	x 12	.57	.57	.58	.58	.64	.64	.63	.61	.60	.59
18	x 14	.47	.47	.49	.51	.60	.62	.62	.61	.61	.60
18	x 16	.40	.40	.43	.46	.58	.61	.61	.61	.61	.61
20	x 14	.52	.52	.53	.55	.62	.63	.63	.61	.60	.59
20	x 16	.45	.45	.47	.50	.60	.62	.62	.61	.61	.60
20	x 18	.40	.40	.43	.46	.58	.61	.61	.61	.61	.61
24	x 16	.57	.57	.58	.58	.64	.64	.63	.61	.60	.59
24	x 18	.49	.49	.51	.53	.59	.62	.62	.62	.61	.60
24	x 20	.43	.43	.46	.48	.59	.61	.62	.61	.61	.60
30	x 18	.66	.66	.66	.65	.68	.66	.64	.62	.60	.58
30	x 20	.57	.57	.58	.58	.64	.64	.63	.61	.60	.59
30	x 24	.45	.45	.47	.50	.60	.60	.62	.61	.61	.60

For larger sizes up to 72", consult factory.

# Cv – Flow Coefficient

Valve flow coefficient –  $C_v$  – indicates valve capacity. It is the flow in gallons per minute of water at 60°F through the valve with 1 psi pressure drop at a stated upstream pressure. In most on/off valve applications, a high  $C_v$  is important. The high  $C_v$  of a full-port sleeve results in low pressure losses through the valve, which increases capacity and reduces pumping costs. High  $C_v$  is a disadvantage in throttling or control applications, however, where the valve is used to absorb pressure.

To maintain a pressure drop across a full-port sleeve, the valve must be positioned in a partially closed position. This results in increased sleeve wear and reduces the control range of the sleeve. If the valve has to be positioned at 50% open to obtain the correct pressure drop at maximum flow, the control range is cut in half, as the valve position above 50% is useless. Red Valve Cone Sleeves solve this problem with a flow restriction that is designed into the sleeve. This allows the valve to operate at positions closer to 100% open.

## How To Use The Flow Coefficient – $C_v$ – Charts

- ▶ From the example on page 17, note line size. In the example on page 17 line size is 3".
- ▶ Select proper valve size from the lefthand column of the  $C_v$  charts below. In the example, valve size is 3"; from the lefthand column, locate valve size 3".
- ▶ Note calculated  $C_v$ . From the example, calculated  $C_v$  is 54.8.
- ▶ Locate from among the three charts, under 100% open, the closest value to calculated  $C_v$ . Closest value for the example is 58.
- ▶ Use this value to determine sleeve trim. In the example, 58 is the  $C_v$  value for a 3" x 1-1/2" Cone Sleeve.

**Note:** For modulating service select  $C_v$  values between 20% and 80% to allow for good control.

### Cv Standard and Double-Wall Sleeve – Series 5200

VALVE SIZE (")	VALVE OPENING-% OF TOTAL TRAVEL									
	10	20	30	40	50	60	70	80	90	100
1	9	18	28	41	50	61	64	65	66	67
1-1/2	19	40	62	91	112	137	143	145	147	148
2	34	70	109	159	196	240	252	255	257	260
2-1/2	53	108	169	247	304	372	390	395	398	402
3	74	152	237	347	427	523	548	554	560	565
4	110	235	389	532	656	759	791	803	811	817
6	160	358	601	941	1214	1417	1513	1567	1609	1643
8	284	635	1065	1670	2155	2514	2682	2779	2853	2913
10	444	993	1666	2613	3370	3931	4168	4345	4460	4552
12	724	1619	2716	4260	5494	6411	6841	7085	7272	7422
14	967	2163	3629	5691	7340	8565	9142	9464	9710	9911
16	1263	2824	4740	7433	9587	11186	11939	12360	12682	12944
18	1611	3604	6049	9485	12234	14275	15236	15773	16184	16519
20	2384	5332	8949	14033	18100	21119	22542	23337	23944	24440
24	2951	6601	11079	17373	22407	26145	27906	28890	29641	30255

For larger sizes up to 72", consult factory.

### Cv Standard and Double-Wall Sleeve – Series 5400

VALVE SIZE (")	VALVE OPENING-% OF TOTAL TRAVEL									
	10	20	30	40	50	60	70	80	90	100
4	110	235	389	532	656	759	791	803	811	817
6	229	552	1038	1390	1527	1594	1643	1670	1691	1700
8	405	979	1843	2466	2706	2827	2913	2961	2998	3014
10	634	1531	2883	3856	4233	4420	4552	4629	4686	4710
12	1034	2496	4701	6288	6902	7207	7422	7548	7641	7680
14	1381	3335	6280	8400	9224	9624	9911	10083	10209	10260
16	1804	4355	8202	10971	12047	12569	12944	13170	13333	13400
18	2302	5558	10467	14000	15373	16040	16519	16806	17015	17100
20	3405	8223	15486	20713	22745	23731	24440	24865	25174	25300
24	4215	10180	19171	25642	28157	29378	30255	30781	31164	31320
30	6737	16270	30641	40983	45003	46954	48356	49197	49809	50058
36	9882	23866	44945	60116	66013	68875	70931	72164	73062	73428
42	15103	36477	68694	91881	100893	105268	108411	110296	111668	112227
48	23457	56654	106690	142703	156699	163494	168375	171302	173434	174302
54	34423	83137	156564	209411	229951	239922	247084	251380	254508	255782

For larger sizes up to 72", consult factory.

# Cv – Flow Coefficient (cont.)

## Cv Cone Sleeve – Series 5200

VALVE SIZE (")		PORT SIZE (")	VALVE OPENING-% OF TOTAL TRAVEL									
			10	20	30	40	50	60	70	80	90	100
1	x	1/3	.10	.44	.88	1.52	1.92	2.46	2.80	3.00	3.24	3.44
1	x	1/2	.2	.9	1.8	3.1	3.9	5	5.7	6.1	6.6	7
1	x	3/4	1.1	2.8	5.6	7.7	11.7	14.5	17	18.9	21	23.3
1-1/2	x	1/2	.31	1.56	2.49	3.74	4.67	4.98	5.60	6.23	6.54	6.85
1-1/2	x	1/4	1	5	8	12	15	16	18	20	21	22
1-1/2	x	1	3	6	10	16	20	28	32	36	37	38
2	x	3/4	.50	2.00	4.00	7.00	9.00	11.50	13.00	14.00	15.00	16.00
2	x	1	1	4	8	14	18	23	26	28	30	32
2	x	1-1/2	4	7	15	26	43	57	65	72	78	84
2-1/2	x	1	.74	1.29	2.78	4.81	7.92	10.53	11.98	13.30	14.38	15.50
2-1/2	x	1-1/2	2.2	3.8	8.2	14.2	23.4	31.1	35.4	39.3	42.5	45.8
2-1/2	x	2	10.7	24	49.3	63.4	79.7	93	118	132	137	153
3	x	1	.89	1.78	3.56	6.52	10.38	12.46	14.83	16.01	16.61	17.20
3	x	1-1/2	3	6	12	22	35	42	50	54	56	58
3	x	2	8	17	32	51	70	92	118	131	143	152
4	x	1-1/2	1.47	2.94	5.88	10.30	19.61	25.99	30.89	34.33	37.76	40.70
4	x	2	3	6	12	21	40	53	63	70	77	83
4	x	3	15	32	63	131	159	197	231	253	286	315
6	x	3	10	17	35	79	101	115	134	148	170	187
6	x	4	23	41	85	190	242	277	322	357	410	450
6	x	5	46	94	174	311	484	618	748	862	948	1028
8	x	4	14	27	54	95	180	239	284	315	347	374
8	x	5	32	57	121	216	346	453	517	573	624	673
8	x	6	58	143	280	396	578	747	884	998	1102	1215
10	x	5	22	38	80	178	226	259	301	334	384	421
10	x	6	34	59	127	220	363	482	549	609	659	710
10	x	8	123	271	523	741	914	1091	1263	1514	1709	1787
12	x	6	25	51	101	177	337	447	532	590	649	700
12	x	8	86	153	317	709	904	1034	1202	1333	1531	1680
12	x	10	144	296	548	975	1519	1942	2349	2707	2979	3229
14	x	8	67	142	267	426	585	768	985	1094	1194	1269
14	x	10	144	303	553	877	1216	1589	2019	2378	2604	2803
14	x	12	193	397	693	1156	1940	2548	3107	3637	4109	4431
16	x	8	54	114	215	343	470	618	793	880	961	1021
16	x	12	205	433	778	1226	1713	2228	2817	3438	3771	4078
16	x	14	271	558	1003	1731	2819	3619	4394	5103	5695	6138
18	x	12	146	260	539	1205	1536	1757	2043	2265	2602	2855
18	x	14	283	596	1082	1712	2381	3181	4040	4707	5158	5567
18	x	16	454	949	1640	2674	4243	5232	6435	7671	8731	9431
20	x	14	305	646	1213	1936	2657	3493	4478	4972	5427	5768
20	x	16	504	1060	1900	2995	4189	5536	7124	8446	9264	10019
20	x	18	480	987	1735	2919	4865	6347	7730	9030	10186	10964
24	x	16	381	678	1405	3142	4007	4583	5327	5908	6786	7446
24	x	18	543	1152	2213	4433	5792	7058	8340	9318	1030	11447
24	x	20	692	1452	2553	4002	5644	7333	9596	11507	12840	13915
30	x	18	440	934	1754	2800	3840	5280	6472	7188	7845	8337
30	x	20	611	1088	2254	5041	6428	7352	8546	9478	10886	11945
30	x	24	1646	3647	7058	9946	12278	14638	17024	29760	22934	23903
36	x	20	511	1081	2030	3239	4446	5843	7490	8318	9079	9649.2
36	x	24	894	1592	3299	7379	9408	10761	12509	13873	15933	17484
36	x	30	1906	3929	7291	13012	20185	25795	31189	35919	39471	42799

For larger sizes up to 72", consult factory.



# Cv – Flow Coefficient (cont.)

## Cv Cone Sleeve – Series 5400

VALVE SIZE (")		PORT SIZE (")	VALVE OPENING-% OF TOTAL TRAVEL									
			10	20	30	40	50	60	70	80	90	100
4	x	1-1/2	1.47	2.94	5.88	10.3	19.61	25.99	30.89	34.33	37.76	40.7
4	x	2	3	6	12	21	40	53	63	70	77	83
4	x	3	15	32	63	131	159	197	231	253	286	315
6	x	3	9.56	17.04	35.32	78.96	100.56	115.11	133.81	148.35	170.38	187.00
6	x	4	23	41	85	190	242	277	322	357	410	450
6	x	5	54.5	113	231	452	612	766	899	987	1089	1210
8	x	4	13.5	27	54	94.6	180	239	284	315	347	374
8	x	5	32	57	121	216	346	453	517	573	624	673
8	x	6	62	156	311	427	653	810	948	1055	1173	1300
10	x	5	22	38	80	178	226	259	301	334	384	421
10	x	6	33.8	59.2	127	220	363	482	549	609	659	710
10	x	8	140	315	648	834	1047	1222	1547	1732	1805	2010
12	x	6	25	51	101	177	337	447	532	590	649	700
12	x	8	85.9	153	317	709	904	1034	1202	1333	1531	1680
12	x	10	171	355	726	1418	1923	2407	2824	3101	3420	3800
14	x	8	67.18	142.16	266.98	426.03	584.66	768.42	985.12	1093.91	1194.02	1269.00
14	x	10	155	328	616	983	1349	1773	2273	2524	2755	2928
14	x	12	250	520	1063	2077	2816	3525	4136	4541	5008	5565
16	x	8	53.95	114.43	214.85	342.82	470.33	618.16	792.61	880.18	960.75	1021.00
16	x	12	231	490	920	1468	2014	2647	3394	3769	4114	4372
16	x	14	336	699	1428	2791	3784	4737	5558	6102	6730	7478
18	x	12	146	260	539	1205	1536	1757	2043	2265	2602	2855
18	x	14	310	658	1236	1973	2708	3721	4561	5065	5528	5875
18	x	16	573	1218	2343	4324	5534	7195	8619	9503	10562	11437
20	x	14	305	646	1213	1936	2657	3493	4478	4972	5427	5768
20	x	16	570	1209	2271	3626	4973	6838	8382	9308	10159	10797
20	x	18	614	1277	2609	5100	6915	8656	10156	1151	12298	13665
24	x	16	381	678	1405	3142	4007	4583	5327	5908	6786	7446
24	x	18	575	1226	2415	5022	6095	7552	8856	9699	10964	12076
24	x	20	818	1735	3260	5204	7138	9815	12031	13360	14581	15497
30	x	18	440	934	1754	2800	3840	5280	6472	7188	7845	8337
30	x	20	611	1088	2254	5041	6428	7352	8546	9478	10886	11945
30	x	24	1869	4204	8649	11132	13975	16310	20648	23117	24092	26828
36	x	20	511	1081	2030	3239	4446	5843	7490	8318	9079	9649
36	x	24	894	1592	3299	7379	9408	10761	12509	13873	15933	17484
36	x	30	2259	4689	9590	18731	25402	31795	37304	40963	45176	50196
42	x	24	766	1622	3046	4860	6670	8766	11238	12479	13622	14477
42	x	30	1665	3522	6615	10557	14487	19040	24410	27105	29586	31444
42	x	36	3781	7865	16078	31414	42592	53315	62557	68682	75745	84170
48	x	30	1215	2132	4558	8125	13023	17055	19460	21586	23485	25347
48	x	36	2705	5739	10775	17193	23587	31001	39749	44141	48181	51203
48	x	42	6527	13578	27738	54213	73502	92013	107961	118527	130726	130726
54	x	36	2066	3681	7626	17056	21747	24874	28916	32067	36831	40415
54	x	42	4102	8708	16356	26109	35809	49241	60357	67027	73154	77746
54	x	48	10407	22122	42556	78537	100514	130682	156546	172602	191837	191837

For larger sizes up to 72", consult factory.

# Viscosity

$C_v$  is useful in sizing for water flow or the flow of liquids that behave like water. However, when the liquid is extremely viscous, particular attention must be paid to the effects the viscosity may have on the size of the valve that is controlling the process fluid.

Although the majority of the valve applications have Reynold's Numbers above 5000 and will involve fluids where viscosity corrections can be ignored or where the corrections are relatively small, fluid viscosity should be considered with each valve selection.

Calculating Reynold's Number:

$$Re = 3160 \times \frac{Q}{d \times K}$$

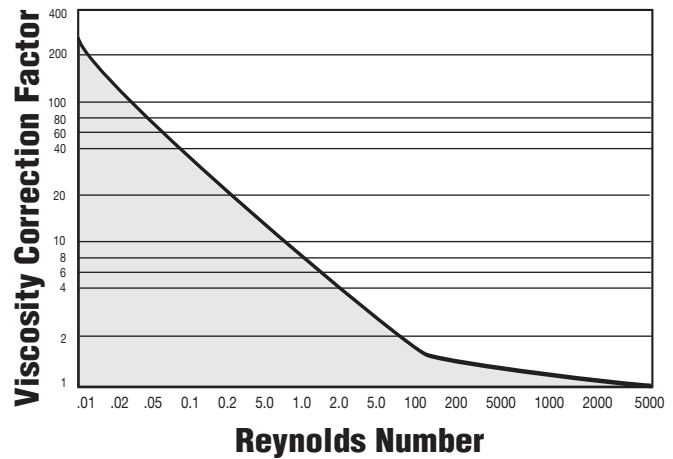
- Re** = Reynold's Number
- Q** = Flow GPM
- d** = Internal diameter in inches
- K** = Viscosity, centistokes

If the calculated Reynold's Number is lower than 3500, then the flow is considered laminar and the viscosity must be corrected according to the Viscosity Conversion Table. This correction factor should be multiplied by the original  $C_v$  value to arrive at the "corrected"  $C_v$  that accounts for viscosity.

## Viscosity Conversion Table

Kinematic Viscosity Centistokes	Seconds Saybolt Universal	Seconds Saybolt Furol
1.00	31	
2.56	35	
4.30	40	
5.90	45	
7.40	50	
8.83	55	
10.20	60	
11.53	65	
12.83	70	12.95
14.10	75	13.33
15.35	80	13.70
16.58	85	14.10
17.80	90	14.44
19.00	95	14.85
20.20	100	15.24
31.80	150	19.3
43.10	200	23.5
54.30	250	28.0
65.40	300	32.5
76.50	350	35.1
87.60	400	41.9
98.60	450	46.8
110.00	500	56.6
121.00	550	56.6
132.00	600	61.4
143.00	650	66.2
154.00	700	71.1
165.00	750	76.0
176.00	800	81.0
187.00	850	86.0
198.00	990	91.0
209.00	950	95.8
220.00	1000	100.7
330.00	1500	150.0
440.00	2000	200.0
550.00	2500	250.0
660.00	3000	300.0
770.00	3500	350.0
880.00	4000	400.0
990.00	4500	450.0
1100.00	5000	500.0
1210.00	5500	550.0
1320.00	6000	600.0
1430.00	6500	650.0
1540.00	7000	700.0
1650.00	7500	750.0
1760.00	8000	800.0
1870.00	8500	850.0
1980.00	9000	900.0
2090.00	9500	950.0
2200.00	10000	1000.0

## Viscosity Correction Table



## Vapor Pressure/Water

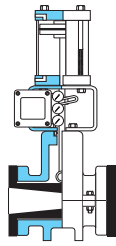
°F	Vapor Pressure (lbs/in <sup>2</sup> asb)	°F	Vapor Pressure (lbs/in <sup>2</sup> asb)
32	0.08859	59	0.24713
33	0.09223	60	0.25611
34	0.09600	62	0.27494
35	0.09991	64	0.29479
36	0.010395	66	0.31626
37	0.10815	68	0.33889
38	0.11249	70	0.36292
39	0.11698	75	0.42964
40	0.12163	80	0.50683
41	0.12645	85	0.59683
42	0.13143	90	0.69813
43	0.13659	95	0.81534
44	0.14192	100	0.94924
45	0.14744	110	1.2750
46	0.15314	120	1.6927
47	0.15904	130	2.2230
48	0.16514	140	2.8892
49	0.17144	150	3.7184
50	0.17796	160	4.7414
51	0.18469	170	5.9926
52	0.19165	180	7.5110
53	0.19883	190	9.340
54	0.20625	200	11.526
55	0.21332	210	14.123
56	0.22183	220	17.186
57	0.23000	230	20.779
58	0.23843	240	24.968

# Velocity

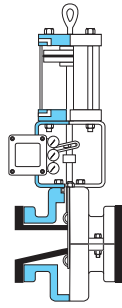
## Velocity and Pressure Drop Through Schedule 40 Pipe

Discharge		Pressure Drop Per 100 Feet and Velocity in Schedule 40 Pipe For Water at 60 ° F															
Gallons per Minute	Cubic Ft. per Second	Velocity Feet per second	Press. Drop Lbs./Sq. Inch	Velocity Feet per second	Press. Drop Lbs./Sq. Inch	Velocity Feet per second	Press. Drop Lbs./Sq. Inch	Velocity Feet per second	Press. Drop Lbs./Sq. Inch	Velocity Feet per second	Press. Drop Lbs./Sq. Inch	Velocity Feet per second	Press. Drop Lbs./Sq. Inch	Velocity Feet per second	Press. Drop Lbs./Sq. Inch	Velocity Feet per second	Press. Drop Lbs./Sq. Inch
.3	0.000668	0.317	0.061														
.4	0.000891	0.422	0.086														
.5	0.00111	0.528	0.167														
.6	0.00134	0.633	0.240														
.8	0.00178	0.844	0.408														
1	0.00223	1.060	0.600														
2	0.00446	2.110	2.100														
3	0.00668	3.170	4.330														
4	0.00891	4.220	7.420														
5	0.0111	5.280	11.20														
6	0.0134	6.330	15.80														
8	0.0178	8.450	27.70														
10	0.0223	10.56	42.40														
15	0.0334																
20	0.0446																
25	0.0557																
30	0.0668																
35	0.0780																
40	0.0891																
45	0.100																
50	0.11																
60	0.13																
70	0.16																
80	0.18																
90	0.20																
100	0.22																
125	0.28																
150	0.33																
175	0.39																
200	0.45																
225	0.50																
250	0.56																
175	0.61																
300	0.67																
325	0.72																
350	0.78																
375	0.84																
400	0.89																
425	0.95																
450	1.00																
475	1.06																
500	1.11																
550	1.23																
600	1.34																
650	1.45																
700	1.56																
750	1.67																
800	1.78																
850	1.89																
900	2.01																
950	2.12																
1000	2.23																
1100	2.45																
1200	2.67																
1300	2.90																
1400	3.12																
1500	3.34																
1600	3.57																
1800	4.01																
2000	4.46																
2500	5.57																
3000	6.68																
3500	7.80																
4000	8.91																
4500	10.03																
5000	11.14																
6000	13.37																
7000	15.60																
8000	17.82																
9000	20.05																
10000	22.28																
12000	26.74																
14000	31.19																
16000	35.65																
18000	40.10																
20000	44.56																

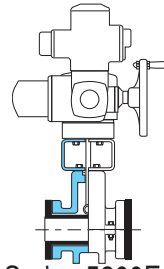
# Control Valve Styles



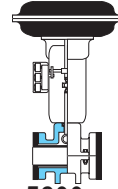
Series 5200



Series 5200 D-Port



Series 5200E  
Electric Actuated

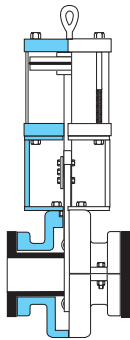


Series 5200  
Diaphragm Actuated

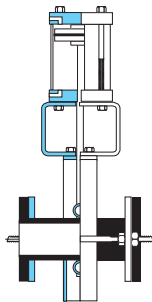
BODY STYLE	Series 5200		Series 5200 D-Port		Series 5200E Electric Actuated		Series 5200 Diaphragm Actuated	
Sizes	1" - 4"		6" - 36"		1" - 48"		1" - 3"	
Flange Drilling	ANSI B16.1 Class 125 ANSI B16.5 Class 150		ANSI B16.1 Class 125 ANSI B16.5 Class 150		ANSI B16.1 Class 125 ANSI B16.5 Class 150		ANSI B16.1 Class 125 ANSI B16.5 Class 150	
Body Materials	ASTM A395	Metal Ductile Iron	ASTM A395	Metal Ductile Iron	ASTM A395	Metal Ductile Iron	ASTM A395	Metal Ductile Iron
	A351	CF8M (316)	A351	CF8M (316)	A351	CF8M (316)	A351	CF8M (316)
Class of Shutoff	Class V		Class V		Class V		Class V	
Actuator	ATO/ATC ATO/FCS ATC/FOS		ATO/ATC ATO/FCS ATC/FOS		Electric On/Off Modulating		ATO/ATC ATO/FCS ATC/FOS	

26

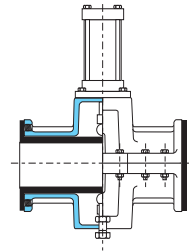
For additional sizes and materials, consult factory. Stainless Steel body materials available only for quantity orders.



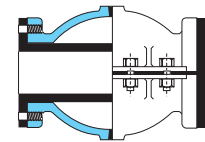
Series 5400



Series 5300



Series 9000



Type A

BODY STYLE	Series 5400		Series 5300		Series 9000		Type A	
Sizes	4" - 36"		2" - 36"		1" - 12"		1/2" - 78"	
Flange Drilling	ANSI B16.1 Class 125 ANSI B16.5 Class 150		ANSI B16.1 Class 125 ANSI B16.5 Class 150		ANSI B16.1 Class 250 ANSI B16.5 Class 300		ANSI B16.1 Class 125 ANSI B16.5 Class 150	
Body Materials	ASTM A395	Metal Ductile Iron	ASTM A395	Metal CF8M (316)	ASTM A395	Metal Ductile Iron	ASTM A126	Metal Cast Iron Class A 1/2"-12" Class B 14"-24"
	A351	CF8M (316)	A351		A351	CF8M (316)	A351	CF8M (316)
Class of Shutoff	Class V		Class V		Class IV		Class IV/V	
Actuator	Pneumatic Hydraulic Electric		Pneumatic Hydraulic Electric		Pneumatic Hydraulic Electric		Self-Actuated Pneumatic Hydraulic	

For additional sizes and materials, consult factory.



Red Valve Company, Inc.

# CONTROL VALVE DATA SHEET

## FAX YOUR INQUIRY TO: 412.279.7878

CUSTOMER P.O. #: \_\_\_\_\_ SALES ORDER #: \_\_\_\_\_ QUOTATION #: \_\_\_\_\_

CUSTOMER:					ACTUATOR FUNCTION	<input type="checkbox"/> THROTTLING <input type="checkbox"/> ON/OFF
					TYPE	<input type="checkbox"/> PNEUMATIC <input type="checkbox"/> ELECTRIC <input type="checkbox"/> HYDRAULIC
CONTACT:					Plant Air Supply	_____ psi min. <input type="checkbox"/> DIAPHRAGM
					Voltage/Frequency /Phases	_____ V    _____ Hz    _____ Phase
PHONE:					Hydraulic Pressure	_____ psi min.
					AIR TO:	<input type="checkbox"/> OPEN <input type="checkbox"/> CLOSE <input type="checkbox"/> DOUBLE ACTING
FAX: _____ EMAIL: _____					AIR FAILS VALVE TO:	<input type="checkbox"/> CLOSE <input type="checkbox"/> OPEN (No Spring) <input type="checkbox"/> OPEN (Spring)
					ATO / ATC	<input type="checkbox"/> R-4 <input type="checkbox"/> R-6 <input type="checkbox"/> R-8
PROJECT REFERENCE:					DOUBLE ACTING	<input type="checkbox"/> R-10 <input type="checkbox"/> R-12 <input type="checkbox"/> R-14 <input type="checkbox"/> R-16
					ATO / FCS	<input type="checkbox"/> RS-4 <input type="checkbox"/> RS-6 <input type="checkbox"/> RS-8
DELIVERY REQUIRED:					FAIL CLOSE-SPRING	<input type="checkbox"/> RS-10 <input type="checkbox"/> RS-12 <input type="checkbox"/> RS-14
					ATC / FOS	<input type="checkbox"/> RS-4 <input type="checkbox"/> RS-6 <input type="checkbox"/> RS-8
DRAWING APPROVAL:					FAIL OPEN-SPRING	<input type="checkbox"/> RS-10 <input type="checkbox"/> RS-12 <input type="checkbox"/> RS-14
					SURGE RELIEF	RSR _____
MODEL <input type="checkbox"/> 5200 <input type="checkbox"/> 5200 RSR <input type="checkbox"/> 5300 <input type="checkbox"/> 5400 <input type="checkbox"/> 5700 <input type="checkbox"/> 5800 <input type="checkbox"/> 9000					INPUT SIGNAL	<input type="checkbox"/> 3 to 15 psi <input type="checkbox"/> 4 to 20 mA
					ON INCREASING	_____
LINE SIZE BODY MATERIAL <input type="checkbox"/> CAST IRON <input type="checkbox"/> DUCTILE IRON <input type="checkbox"/> ANSI 125/150 B16.1					SIGNAL VALVE	<input type="checkbox"/> OPENS <input type="checkbox"/> CLOSES
					FLANGE CLASS DRILLING	_____
PIPE <input type="checkbox"/> WCB <input type="checkbox"/> CF8 <input type="checkbox"/> WCBCF8M <input type="checkbox"/> ANSI 250/300 B16.5					POSITIONER	<input type="checkbox"/> PNEUMATIC <input type="checkbox"/> ELECTROPNEUMATIC
					SCH.	<input type="checkbox"/> ALUMINUM <input type="checkbox"/> OTHER _____ <input type="checkbox"/> OTHER _____
FLOW MEDIA (Describe):					ACCESSORIES	<input type="checkbox"/> 3 WAY ASCO MODEL #EF83206172
					SOLENOID	<input type="checkbox"/> 4 WAY ASCO MODEL #EF8342C1
SLEEVE MATERIAL <input type="checkbox"/> PURE GUM 180°F <input type="checkbox"/> NEOPRENE 230°F <input type="checkbox"/> VITON 400°F <input type="checkbox"/> BUNA-N 230°F <input type="checkbox"/> CHLOROBUTYL 250°F <input type="checkbox"/> HYPALON 230°F <input type="checkbox"/> EPDM 300°F <input type="checkbox"/> URETHANE 230°F <input type="checkbox"/> FOOD GRADE <input type="checkbox"/> OTHER _____					VALVES	<input type="checkbox"/> 120V/60Hz <input type="checkbox"/> OTHER _____
					REGULATORS	<input type="checkbox"/> NEMA 4 <input type="checkbox"/> NEMA 7 <input type="checkbox"/> FISHER FILTER REGULATOR #67CFR <input type="checkbox"/> OTHER _____
SLEEVE STYLE & SIZE _____ " X _____ " <input type="checkbox"/> FULL PORT <input type="checkbox"/> DOUBLE WALL <input type="checkbox"/> REDUCED PORT <input type="checkbox"/> CONE SLEEVE <input type="checkbox"/> VARIABLE ORIFICE					LIMIT SWITCHES	<input type="checkbox"/> GO # 75-13528-A2
					MICROSWITCH	<input type="checkbox"/> GO EXPLOSION PROOF # 75-13523-A2 <input type="checkbox"/> OTHER _____
FLOW DATA MINIMUM FLOW TO BE CONTROLLED    NORMAL FLOW TO BE CONTROLLED    MAXIMUM FLOW TO BE CONTROLLED    ANS/ICI LEAKAGE CLASS <input type="checkbox"/> VI <input type="checkbox"/> V <input type="checkbox"/> IV <input type="checkbox"/> III <input type="checkbox"/> II <input type="checkbox"/> I					FUNCTION	<input type="checkbox"/> INDICATE VALVE OPEN <input type="checkbox"/> INDICATE VALVE CLOSED
					ADDITIONAL ACCESSORIES	<input type="checkbox"/> MANUAL OVERRIDE <input type="checkbox"/> IN LINE WITH PIPELINE <input type="checkbox"/> PERPENDICULAR TO PIPELINE <input type="checkbox"/> OTHER _____
Q (Flow Rate In U.S. GPM)				SHUTOFF <input type="checkbox"/> YES <input type="checkbox"/> NO	SPECIAL TAGGING	_____
P1 (Inlet Pressure at Controlled Flow Rate) psig					SPECIAL COATINGS OR ADDITIONAL NOTES	_____
P2 (Outlet Pressure at Controlled Flow Rate) psig						_____
ΔP (P1-P2) at Controlled Flow Rate						_____
SPECIFIC GRAVITY						_____
INLET TEMPERATURE (°F)						_____
Cv (Flow Coeff. - Required)						_____
APPROACH VELOCITY (fps)						_____
ΔP MAX (Calculated)					PRICE	\$ _____

Use 1 (one) form for each control valve. Make additional photocopies for more forms.

Fax to number at top of this page.

PREPARED BY: \_\_\_\_\_ DATE: \_\_\_\_\_



Valve Company, Inc.

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Building 2  
Carnegie, PA 15106

PHONE:  
**412/279-0044**

FAX:  
**412/279-7878**

[www.redvalve.com](http://www.redvalve.com)

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