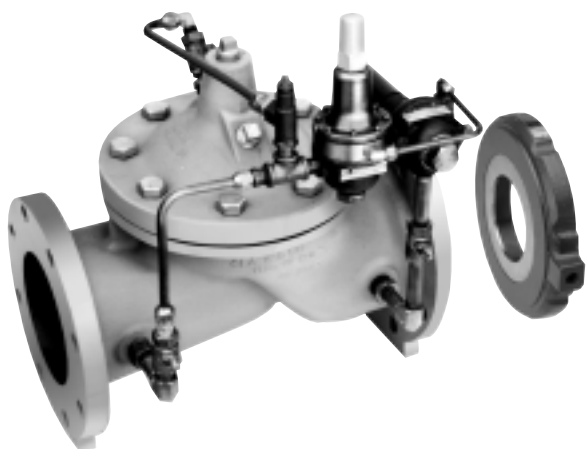


# Combination Rate of Flow & Pressure Reducing Valve



- Multi-Functional Capability
- Accurate & Immediate Control
- Includes Orifice Plate with Holder
- Optional Check Feature
- Easily Adjustable Controls

The Cla-Val Model 49-01/649-01 Rate of Flow and Pressure Reducing Valve automatically reduces a higher inlet pressure to a steady lower downstream pressure regardless of changing flow rate and/or varying inlet pressure, as long as the flow rate is below a preset maximum. It also prevents excessive flow by limiting flow to a preselected maximum rate.

This valve is a hydraulically operated, pilot controlled diaphragm valve. The pilot system includes a direct acting pressure reducing pilot and a rate of flow differential control. The pressure reducing pilot is responsive to slight variations in downstream pressure and immediately controls the main valve to maintain the desired line pressure.

The rate of flow control responds to the differential pressure produced across an orifice plate in the main line. Accurate control is assured as very small changes in the controlling differential pressure produce immediate corrective action by the main valve.

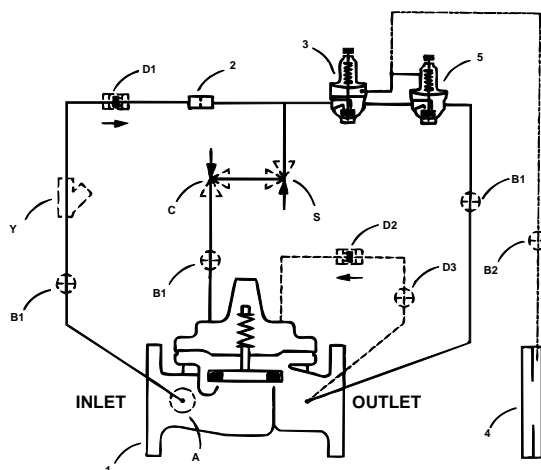
If the check feature option is added and a pressure reversal occurs, the downstream pressure is admitted into the main valve cover chamber and the valve closes to prevent return flow.

## Schematic Diagram

Item	Description
1	Hytrol (Main Valve)
2	X58A Restriction Fitting
3	CRA Pressure Reducing Control
4	X52E Orifice Plate Assembly
5	CDHS18 Differential Control

## Optional Features

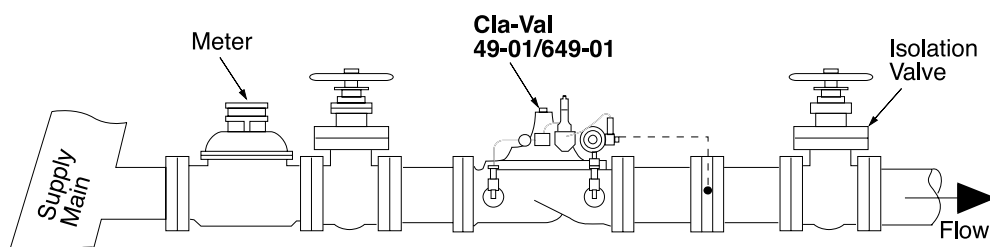
Item	Description
A	X46A Flow Clean Strainer
B	CK2 Cock (Isolation Valve)
C	CV Flow Control (Closing)
D	Check Valves with Cock
S	CV Flow Control (Opening)
Y	X43 "Y" Strainer



The "D" feature on a vertically installed 6" and larger valve must be horizontally installed.

## Typical Application

Installed where water supply to a system must be limited to a preset flow to prevent lowering the supply pressure. Easily set to maintain the maximum allowable flow rate.



## Model 49-01 (Uses Basic Valve Model 100-01)

### Pressure Ratings (Recommended Maximum Pressure - psi)

Valve Body & Cover		Pressure Class			
		Flanged			Screwed
Grade	Material	ANSI Standards*	150 lb.	300 lb.	End** Details
ASTM A536	Ductile Iron	B16.42	250	400	400
ASTM A216-WCB	Cast Steel	B16.5	285	400	400
ASTM B62	Bronze	B16.24	225	400	400
ASTM A743	Stainless Steel	B16.5	285	400	400
356-T6	Aluminum	B16.1	275	—	—

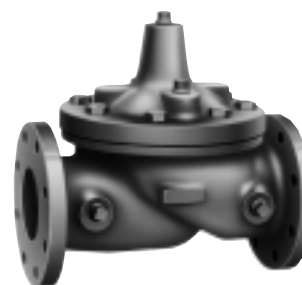
Note: \*ANSI standards are for flange dimensions only.  
 Flanged valves are available faced but not drilled.  
 \*\* End Details machined to ANSI B2.1 specifications.

### Materials

Component	Material Options						
Body & Cover	Ductile Iron	Cast Steel	Bronze	Stainless Steel	Aluminum		
Available Sizes	1½" - 16", 24"	1½" - 16", 24"	1½" - 16"	1½" - 16"	1½" - 16"		
Disc Retainer & Diaphragm Washer	Cast Iron	Cast Steel	Bronze	Stainless Steel	Aluminum		
Trim: Disc Guide, Seat & Cover Bearing	Bronze is standard. Stainless Steel is optional.			Stainless Steel is standard.			
Disc	Buna-N® Rubber						
Diaphragm	Nylon Reinforced Buna-N® Rubber						
Stem, Nut & Spring	Stainless Steel						



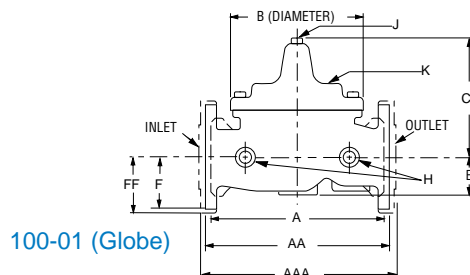
2" Globe, Screwed



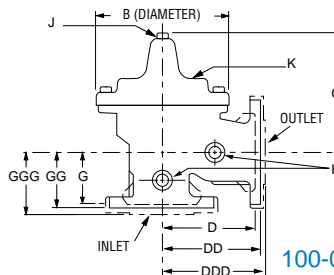
4" Globe, Flanged



4" Angle, Flanged



100-01 (Globe)



100-01 (Angle)

### Model 49-01 Dimensions (In inches)

\*1½" Size Only

Valve Size (Inches)	1½	2	2 ½	3	4	6	8	10	12	14	16	24
<b>A</b> Screwed	7.25	9.38	11.00	12.50	—	—	—	—	—	—	—	—
<b>AA</b> 150 ANSI	8.50*	9.38	11.00	12.00	15.00	20.00	25.38	29.75	34.00	39.00	41.38	61.50
<b>AAA</b> 300 ANSI	9.00	10.00	11.62	13.25	15.62	21.00	26.38	31.12	35.50	40.50	43.50	63.24
<b>B</b> Dia.	5.62	6.62	8.00	9.12	11.50	15.75	20.00	23.62	28.00	32.75	35.50	53.16
<b>C</b> Max.	5.50	6.50	7.56	8.19	10.62	13.38	16.00	17.12	20.88	24.19	25.00	43.93
<b>D</b> Screwed	3.25	4.75	5.50	6.25	—	—	—	—	—	—	—	—
<b>DD</b> 150 ANSI	4.00*	4.75	5.50	6.00	7.50	10.00	12.75	14.88	17.00	19.50	20.81	—
<b>DDD</b> 300 ANSI	4.25*	5.00	5.88	6.38	7.88	10.50	13.25	15.56	17.75	20.25	21.62	—
<b>E</b>	1.12	1.50	1.69	2.06	3.19	4.31	5.31	9.25	10.75	12.62	15.50	17.75
<b>F</b> 150 ANSI	2.50	3.00	3.50	3.75	4.50	5.50	6.75	8.00	9.50	10.50	11.75	19.25
<b>FF</b> 300 ANSI	3.06	3.25	3.75	4.13	5.00	6.25	7.50	8.75	10.25	11.50	12.75	—
<b>G</b> Screwed	1.88	3.25	4.00	4.50	—	—	—	—	—	—	—	—
<b>GG</b> 150 ANSI	4.00*	3.25	4.00	4.00	5.00	6.00	8.00	8.62	13.75	14.88	15.69	—
<b>GGG</b> 300 ANSI	4.25*	3.50	4.31	4.38	5.31	6.50	8.50	9.31	14.50	15.62	16.50	—
<b>H</b> NPT Body Tapping	¾	¾	½	½	¾	¾	1	1	1	1	1	1
<b>J</b> NPT Cover Center Plug	¼	½	½	½	¾	¾	1	1	1 ¼	1 ½	2	1½
<b>K</b> NPT Cover Tapping	¾	¾	½	½	¾	¾	1	1	1	1	1	1
Valve Stem Internal												
Thread UNF	10-32	10-32	10-32	¼-28	¼-28	¾-24	¾-24	¾-24	¾-24	¾-24	½-20	¾-16
Stem Travel	0.4	0.6	0.7	0.8	1.1	1.7	2.3	2.8	3.4	4.0	4.5	6.50
Approx. Ship Wt. Lbs.	15	35	50	70	140	285	500	780	1165	1600	2265	6200

## Model 649-01 (Uses Basic Valve Model 100-20)

### Pressure Ratings (Recommended Maximum Pressure - psi)

Valve Body & Cover		Pressure Class		
		Flanged		
Grade	Material	ANSI Standards*	150 lb.	300 lb.
ASTM A536	Ductile Iron	B16.42	250	400
ASTM A216-WCB	Cast Steel	B16.5	285	400
ASTM B62	Bronze	B16.24	225	400
ASTM A743	Stainless Steel	B16.5	285	400
356-T6	Aluminum	B16.1	275	—

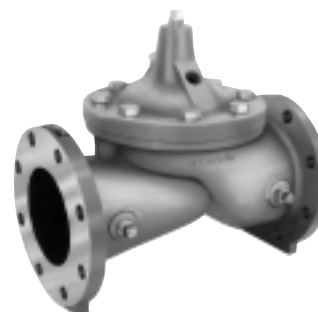
Note: \*ANSI standards are for flange dimensions only.  
Flanged valves are available faced but not drilled.



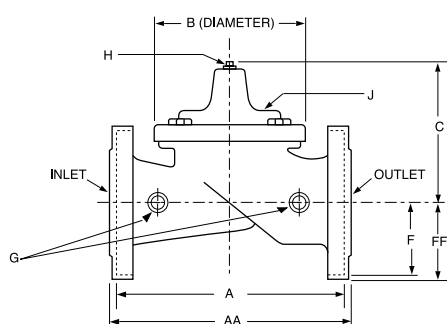
3" Globe, Flanged

### Materials

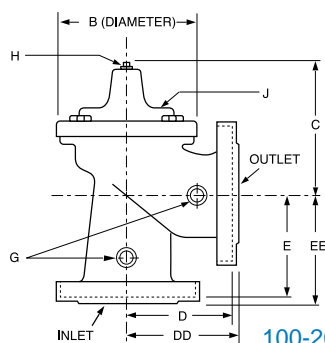
Component	Material Options						
Body & Cover	Ductile Iron	Cast Steel	Bronze	Stainless Steel	Aluminum		
Available Sizes	3"-30"	3"-30"	3"-16"	3"-16"	3"-16"		
Disc Retainer & Diaphragm Washer	Cast Iron	Cast Steel	Bronze	Stainless Steel	Aluminum		
Trim: Disc Guide, Seat & Cover Bearing	Bronze is standard. Stainless Steel is optional.			Stainless Steel is standard.			
Disc	Buna-N® Rubber						
Diaphragm	Nylon Reinforced Buna-N® Rubber						
Stem, Nut & Spring	Stainless Steel						



6" Globe, Flanged



100-20 (Globe)



100-20 (Angle)










































6" Angle, Flanged

### Model 649-01 Dimensions (In inches)

VALVE SIZE (Inches)	3	4	6	8	10	12	14	16	18	20	24	30
A 150 ANSI	10.25	13.88	17.75	21.38	26.00	30.00	34.25	35.00	42.12	48.00	48.00	63.25
AA 300 ANSI	11.00	14.50	18.62	22.38	27.38	31.50	—	36.62	43.63	49.62	49.75	—
B DIA.	6.62	9.12	11.50	15.75	20.00	23.62	28.00	28.00	35.44	35.44	35.44	53.19
C MAX.	7.00	8.62	11.62	15.00	17.88	21.00	20.88	25.75	25.00	31.00	31.00	43.94
D 150 ANSI	—	6.94	8.88	10.69	—	—	—	—	—	—	—	—
DD 300 ANSI	—	7.25	9.38	11.19	—	—	—	—	—	—	—	—
E 150 ANSI	—	5.50	6.75	7.25	—	—	—	—	—	—	—	—
EE 300 ANSI	—	5.81	7.25	7.75	—	—	—	—	—	—	—	—
F 150 ANSI	3.75	4.50	5.50	6.75	8.00	9.50	11.00	11.75	15.88	14.56	17.00	19.88
FF 300 ANSI	4.12	5.00	6.25	7.50	8.75	10.25	—	12.75	15.88	16.06	19.00	—
G NPT Body Tapping	3/8	1/2	3/4	3/4	1	1	1	1	1	1	1	1
H NPT Cover Center Plug	1/2	1/2	3/4	3/4	1	1	1 1/4	1 1/4	2	2	2	2
J NPT Cover Tapping	3/8	1/2	3/4	3/4	1	1	1	1	1	1	1	1
Valve Stem Internal Thread UNF	10-32	1/4-28	1/4-28	3/8-24	3/8-24	3/8-24	3/8-24	3/8-24	1/2-20	1/2-20	1/2-20	3/4-16
Stem Travel	0.6	0.8	1.1	1.7	2.3	2.8	3.4	3.4	4.5	4.5	4.5	6.5
Approx Ship Wt. Lbs.	45	85	195	330	625	900	1250	1380	2733	2551	2733	6500

## Valve Selection

These Symbols  and  Indicate Available Sizes

		Inches	1 1/2	2	2 1/2	3	4	6	8	10	12	14	16	18	20	24	30
		mm	40	50	65	80	100	150	200	250	300	350	400	450	500	600	750
		End Detail	Screwed & Flanged						Flanged								
Model 49-01	Basic Valve 100-01	Globe															
		Angle															
	Suggested Flow (GPM)	Max. Continuous	125	210	300	460	800	1800	3100	4900	7000	8400	11000			25000	
		Max. Intermittent	160	260	370	580	990	2250	3900	6150	8720	10540	13700			31300	
		Min. Continuous	10	15	20	30	50	115	200	300	400	500	650			1750	
	Suggested Flow (Liters/sec)	Max. Continuous	8	13	19	29	50	113	195	309	441	529	693			1575	
		Max. Intermittent	10.1	16.4	23	37	62	142	246	387	549	664	863			1972	
		Min. Continuous	.6	.9	1.3	1.9	3.2	7.2	13	19	25	32	41			110	
Model 649-01	Basic Valve 100-20	Globe															
		Angle															
	Suggested Flow (GPM)	Max. Continuous				260	580	1025	2300	4100	6400	9230	9230	16500	16500	16500	28000
		Min. Continuous				15	30	50	115	200	300	500	500	900	900	900	1850
	Suggested Flow (Liters/sec)	Max. Continuous				16	37	65	145	258	403	581	581	1040	1040	1040	1764
		Min. Continuous				.9	1.9	3.2	7.2	13	19	32	32	57	57	57	117

\* 649-01 is the reduced internal port size version of the 49-01.

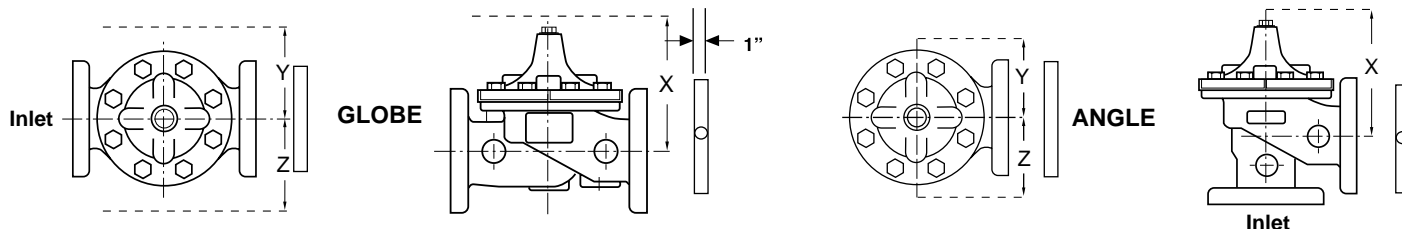
For 100-01 basic valves suggested flow calculations were based on flow through Schedule 40 Pipe. Maximum continuous flow is approx. 20 ft/sec (6.1 meters/sec) & maximum intermittent is approx. 25 ft/sec (7.6 meters/sec) and minimum continuous flow is approx. 1 ft/sec (.3 meters/sec). For 100-20 basic valves suggested flow calculations were based on flow through the valve seat. Approx. 26 ft/sec (7.9 meters/sec) was used for maximum continuous flow & 1 ft/sec (.3 meters/sec) is used for minimum continuous flow. Maximum continuous flow through the valve seat for the 30" 100-20 is approx. 20 ft/sec (6.1 meters/sec). \*\*Flanged End Detail Only

Many factors should be considered in sizing pressure reducing valves including inlet pressure, outlet pressure and flow rates. For sizing questions or cavitation analysis, consult Cla-Val with system details.

## Pilot System Dimensions (In Inches)

We recommend providing adequate space around valve for maintenance work

VALVE SIZE	1 1/2"	2"	2 1/2"	3"	4"	6"	8"	10"	12"	14"	16"	18"	20"	24"	30"
X Max.	11.50	11.75	12.25	12.75	13.75	15.75	17.75	17.75	21.75	21.75	23.75	23.75	23.75	50.00	50.00
Y Max.	4.00	4.00	4.50	5.00	6.00	8.00	10.25	12.00	14.25	16.75	18.00	18.00	18.00	30.00	30.00
Z Max.	6.75	6.75	7.75	8.25	9.50	10.25	11.00	14.50	15.50	16.75	19.00	19.00	19.00	30.00	30.00



## Pilot System Specifications

### Adjustment Ranges

CRA: 2 to 30 psi  
15 to 75 psi  
30 to 300 psi  
CDHS-18: Low flow equals  
1/4 max. flow.

### Materials

#### Standard Pilot System Materials

Pilot Control: Bronze ASTM B62  
Trim: Stainless Steel 303  
Orifice Plate: Stainless Steel 303  
Rubber: Buna-N® Synthetic Rubber

#### Optional Pilot System Materials

Pilot systems are available with  
optional Aluminum, Stainless Steel  
or Monel materials at extra cost.

### Temperature Range

Water: to 180°F

**Note:** Orifice plate assembly (X52E) may be attached to the main valve outlet flange, however, better control is obtained if it is located one to five pipe diameters downstream. Orifice plate sensing connection should be located in the pipeline on the side of the orifice plate assembly. The orifice plate assembly should not be mounted directly to a butterfly valve.

## When Ordering, Please Specify

1. Catalog No. 49-01 or No. 649-01
2. Valve Size
3. Pattern - Globe or Angle
4. Pressure Class
5. Screwed or Flanged
6. Trim Material
7. Adjustment Range/Orifice Bore
8. Desired Options
9. When Vertically Installed



E-49-01/649-01 (R-11/01)

## CLA-VAL

PO Box 1325 Newport Beach CA 92659-0325  
Phone: 949-722-4800 • Fax: 949-548-5441

### CLA-VAL CANADA, LTD.

4687 Christie Drive  
Beamsville, Ontario  
Canada LOR 1B4  
Phone: 905-563-4963  
Fax: 905-563-4040

© COPYRIGHT CLA-VAL 2001 Printed in USA  
Specifications subject to change without notice.

### CLA-VAL SA

Chemin des Mesanges 1  
CH-1032 Romanel/  
Lausanne, Switzerland  
Phone: 41-21-643-15-55  
Fax: 41-21-643-15-50

www.cla-val.com

## Represented By: