



MODEL 349-01  
3649-01

## Electronic Actuated Rate of Flow and Pressure Reducing Valve

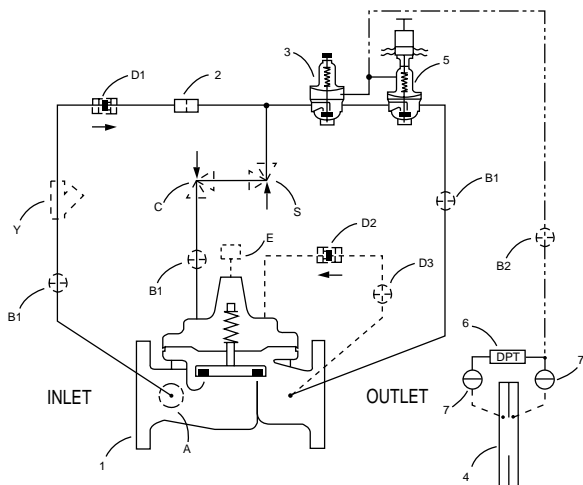


### Schematic Diagram

Item	Description
1	Hytrol (Main Valve)
2	X58C Restriction Fitting
3	CRA Pressure Reducing Control
4	X52D-1 Orifice Plate Assembly
5	CDHS-30 Electronic Flow Control Pilot
6	DPT-Differential Pressure Transmitter
7	CK2 Cock (Isolation Valve)

### Optional Features

Item	Description
A	X46A Flow Clean Strainer
B	CK2 Cock (Isolation Valve)
C	CV Flow Control (Closing)
D	Check Valves with Cock
E	X117D Position Transmitter
S	CV Flow Control (Opening)
Y	X43 "Y" Strainer



- Simplified Interfacing with SCADA Systems
- Accepts Local or Remote Setpoint
- Integral Loop Power Supply
- Accurate Pressure Control
- Reliable Hydraulic Operation
- Rugged Durable Design

The Cla-Val Model 349-01/3649-01 Electronic Actuated Rate of Flow and Pressure Reducing Control Valve combines the precise control of field proven Cla-Val hydraulic pilots and the convenience and versatility of remote setpoint control. The Model 349-01/3649-01 control 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 remotely set maximum rate.

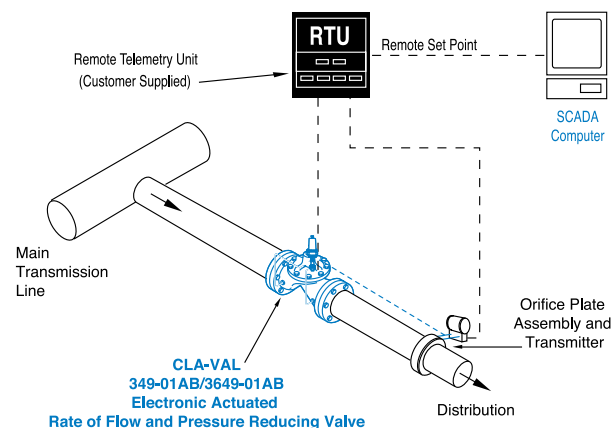
This valve is a hydraulically operated, pilot controlled diaphragm actuated control valve. The pilot system includes a direct acting pressure reducing pilot and an electronically actuated rate of flow control. The pressure reducing pilot is manually set and responsive to slight variations in downstream pressure and immediately controls the main valve to maintain the desired line pressure. The rate of flow pilot control, consisting of a hydraulic pilot and integral controller, accepts a setpoint and compares it with the flow or internal potentiometer signal and makes incremental adjustments to modulate the valve to setpoint.

Adjustable solid state limit switches eliminate over ranging. In the event of a power or transmitter failure, the CDHS-30 hydraulic pilot remains in valve control virtually assuring system stability under changing conditions. If check feature ("D") is added, and pressure reversal occurs, the valve closes to prevent return flow.

### Typical Applications

This valve is designed to be used with supervisory control systems having an isolated remote analog setpoint output and a process variable flow transmitter input. The 349-01/3649-01 is typically installed in systems requiring remote setpoint changes of flow rates. It is also an effective solution for lowering costs associated with "confined space" requirements by eliminating the need for entry into valve structure for setpoint adjustment and system information.

Additional Pilot Controls, hydraulic and/or electronic, can be easily added to perform multiple control functions to fit exact system requirements.



## Model 349-01 (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.



2" Globe, Screwed



4" Globe, Flanged

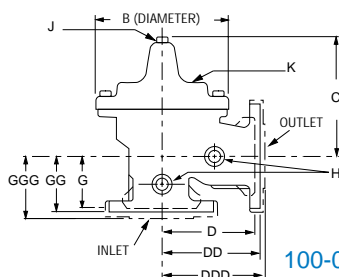
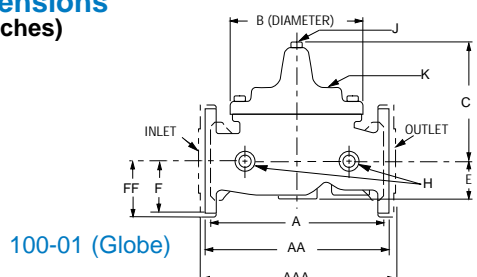


4" Angle, Flanged

### 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						

### Dimensions (In inches)



\*1½" Size Only

Valve Size (Inches)	1½	2	2½	3	4	6	8	10	12	14	16	24
A Screwed	7.25	9.38	11.00	12.50	—	—	—	—	—	—	—	—
AA 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
AAA 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 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
C 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
D Screwed	3.25	4.75	5.50	6.25	—	—	—	—	—	—	—	—
DD 150 ANSI	4.00*	4.75	5.50	6.00	7.50	10.00	12.75	14.88	17.00	19.50	20.81	—
DDD 300 ANSI	4.25*	5.00	5.88	6.38	7.88	10.50	13.25	15.56	17.75	20.25	21.62	—
E	1.12	1.50	1.69	2.06	3.19	4.31	5.31	9.25	10.75	12.62	15.50	17.75
F 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
FF 300 ANSI	3.06	3.25	3.75	4.13	5.00	6.25	7.50	8.75	10.25	11.50	12.75	—
G Screwed	1.88	3.25	4.00	4.50	—	—	—	—	—	—	—	—
GG 150 ANSI	4.00*	3.25	4.00	4.00	5.00	6.00	8.00	8.62	13.75	14.88	15.69	—
GGG 300 ANSI	4.25*	3.50	4.31	4.38	5.31	6.50	8.50	9.31	14.50	15.62	16.50	—
H NPT Body Tapping	¾	¾	½	½	¾	¾	1	1	1	1	1	1
J NPT Cover Center Plug	¼	½	½	½	¾	¾	1	1	1 ¼	1 ½	2	1 ½
K 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 3649-01 (Uses Basic Valve Model 100-20)

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

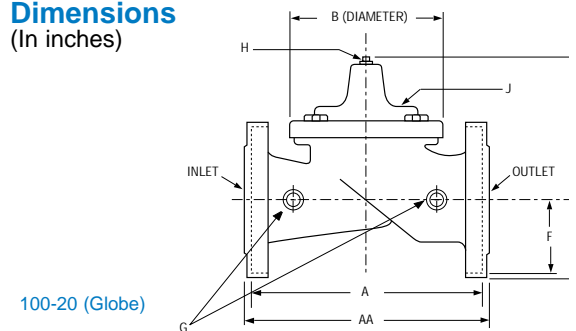
Valve Body & Cover		Pressure Class		
		Flanged		
Grade	Material	ANSI Standards*	150 lb.	300 lb.
ASTM A536	Ductile Iron	B16.42	250	400
ASTM A216-WCB	Cast Steel	B16.5	285	400
ASTM B62	Bronze	B16.24	225	400
ASTM A743	Stainless Steel	B16.5	285	400
356-T6	Aluminum	B16.1	275	—

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

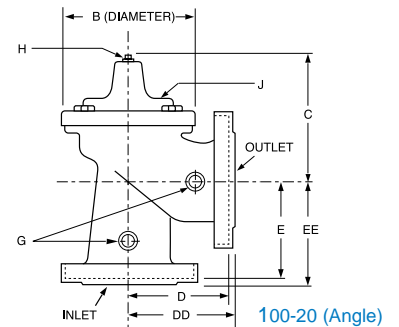
### Materials

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						

### Dimensions (In inches)



100-20 (Globe)



3" Globe, Flanged

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

### 349-01/3649-01 Purchase Specifications

The 349-01/3649-01 Electronic Actuated Rate of Flow and Hydraulic Pressure Reducing Control Valve shall have an integral hydraulic and electronic controller contained in a NEMA 4 enclosure to provide the interface between remote telemetry and valve control. It will compare a selectable remote analog or local setpoint with a process variable signal or internal position sensor signal and automatically adjust the hydraulic pilot control until the main control valve reaches desired setpoint.


























The electronic actuator will supply loop power for the process variable signal. Retransmission of the process variable shall be with an isolated non-powered analog signal. The actuator speed will be infinitely adjustable between 1/3 and 5 RPM and will have an adjustable dead band. In the event of an erroneous communications signal, actuator output will be capable of being limited to a predetermined process variable value. If these signals (SP and/or PV) are lost, the valve shall remain under control of the pressure reducing and flow limiting hydraulic control. The actuator can also be programmed to drive the main valve to the open or closed position if these signals are lost.
















All setup and adjustments will be capable of being made prior to placing the valve into service using actuator test points for signal measurement and subsequent calibration. Actuator diagnostics will be displayed using LEDs. Manual operation of the hydraulic pilot will be fully adjustable using a non-rotating handwheel.

The Electronic Actuated Rate of Flow and Pressure Reducing Control Valve shall be the Cla-Val Model 349-01/3649-01 as manufactured by Cla-Val, Newport Beach, CA.

## Valve Selection

These Symbols  and  Indicate Available Sizes

		Valve Selection																
		Inches	1 1/4	1 1/2	2	2 1/2	3	4	6	8	10	12	14	16	18	20	24	30
		mm	32	40	50	65	80	100	150	200	250	300	350	400	450	500	600	750
		End Detail	Screwed	Screwed & Flanged					Flanged									
Model 349-01	Basic Valve 100-01	Globe																
		Angle																
	Suggested Flow (GPM)	Max. Continuous	93	125	210	300	460	800	1800	3100	4900	7000	8400	11000			25000	
		Max. Intermittent	120	160	260	370	580	990	2250	3900	6150	8720	10540	13700			31300	
		Min. Continuous	10	10	15	20	30	50	115	200	300	400	500	650			1750	
	Suggested Flow (Liters/sec)	Max. Continuous	6	8	13	19	29	50	113	195	309	441	529	693			1575	
		Max. Intermittent	7.6	10.1	16.4	23	37	62	142	246	387	549	664	863			1972	
		Min. Continuous	.6	.6	.9	1.3	1.9	3.2	7.2	13	19	25	32	41			110	

Model 3649-01	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

\* 3649-01 is the reduced internal port size version of the 349-01.

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 flow is approx. 25 ft/sec (7.6 meters/sec) & 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) is 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

We recommend providing adequate space around valve for maintenance work

## Pilot System Specifications

### Adjustment Ranges

#### CDHS-30:

Low flow equals one-fourth maximum flow

CRA: 2 to 30 psi

15 to 75 psi

30 to 300 psi

#### Temperature Ranges:

Water to 180°F

#### Materials:

##### Standard Pilot System Materials

Pilot Control: Bronze ASTM B62

Trim: Stainless Steel Type 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.

Note: Orifice plate assembly (X52D-1) is 1 1/2" thick and must be installed minimum 5 pipe diameters downstream of valve with a minimum of 3 pipe diameters of straight pipe downstream of orifice plate assembly. Orifice plate assembly sensing connections should be located to the side of the pipeline. To increase measurement accuracy recommended minimum is 10 pipe diameters upstream and 5 pipe diameters downstream of the orifice plate assembly.

## When Ordering, Please Specify

- Catalog No. 349-01 or 3649-01
- Valve Size
- Pattern - Globe or Angle
- Pressure Class
- Screwed or Flanged
- Trim Material
- Adjustment Range
- Desired Options
- When Vertically Installed

## Electronic Actuator - CDHS-30 Pilot Control

**Input Voltage:** 120/240 Vac +/- 10%, 50/60 Hz

**Operating Current:** 2 Amperes at 120 Vac

**Process Variable:** Field Selectable between 4-20mA transmitter (supplied by others) or internal potentiometer

**Loop Power Supply:** 0-24 VDC

**Retransmission:** Isolated non-powered 4-20mA

**Input Signal Monitor:** If process variable is lost actuator holds in present position, opens or closes, field selectable

**Setpoint:** Field selectable between local and remote 4-20 mA, 0-5 Volt, 0-10 Volt

**Manual Adjustment:** Non-rotating handwheel

**Limit Switches:** Electronic-Full range adjustable

**Terminations:** Terminal blocks accepting up to #16 Awg solid or stranded wire

**Operating Temperature:** 0°F to 150 °F (-18 C to 65 C)

**Environmental Rating:** Enclosure rated NEMA type 4 indoor/outdoor, corrosion resistant aluminum



E-349-01/3649-01 (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

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### 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: