

Product Catalog
Automatic Control Valves

Automatic Control Valves



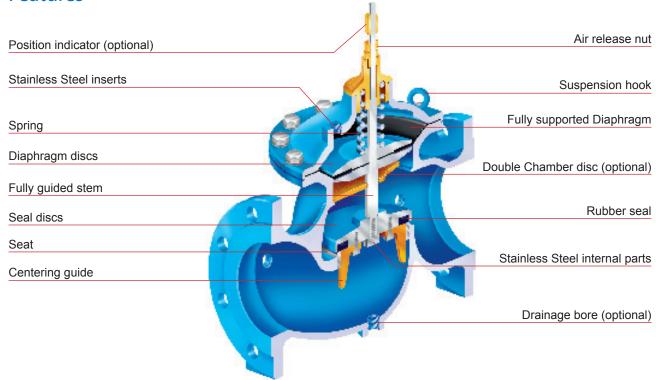
General Information

Overview

BEECO'S ACV, the latest line of state-of-the-art globe type automatic control valves, is designed to withstand even the most demanding requirements of water system control.

This Engineering Data guide will asist the reader in the selection of the optimal BEECO ACV valve.

Features



Features of the ACV

- The capability to regulate near zero flow, as standard on all sizes, completely eliminating the need for a special low flow device (throttling plug) or a low flow bypass valve, while ensuring very low head loss in "fully open" position.
- A standard valve model, fit for all control operations.
 A specific pilot(s) provides the required application.
- The flange (face-to-face) dimensions suit ISO Standards. This allows for quick and easy replacement of old equipment, without the need for additional pipeline modifications.
- The valve has an internal floating shaft, allowing for no friction or leakage, eliminating the need for shaft sealing. The unique design of the shaft provides for easy field maintenance.
- The valve has a resilient seal disc, guided by an almost frictionless centering device.
- The valve's body is made of Ductile Iron, withstanding

- both high hydraulic and mechanical stresses.
- A standard single-chamber valve, enabling jam-free operation in sensitive regulation conditions. When required, conversion from a single to a double chambered valve is easily accomplished through the insertion of Beeco's innovative separation disc, without the need to remove the valve from the pipeline during the conversion.
- The valve is supplied with a replaceable seat, made of SST, which maintains excellent durability against erosion and ensuring a drip-tight seal.
- During the closing procedure, the pace slows down, preventing any damage that may occur from water slam/surge.
- The series includes, as an optional feature, a valve position indicator, attached by a floating connection (ball & socket), resulting in smooth movement, with no wear or tear on the indicator seal.



Technical Specifications

Parameter	Standard	Optional			
Connections	Flanged ANSI B16Threaded NPT	Flanges ISO, AS10, JIS B22, and others			
Pressure range	 Model ACV-HF: 7 – 250 psi Models ACV &: 7 – 360 psi ACV-HF-HP 	0 min. press. with N.O spring assisted opening. 3 psi min. pressure without a spring Note: both options require usage of external higher closing pressure			
Max. Water Temperature	• 180°F	• 200°F			

Materials

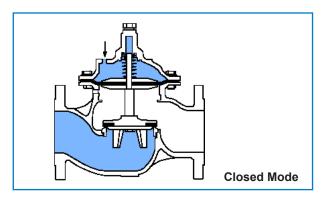
Part	Standard	Optional
Body & Cover	Ductile Iron GGG50 (ASTM A-536)	Cast Steel A-216 WCB Cast Bronze or Marine Bronze Cast SST CF8M (316) Ni Aluminum Bronze Others
Main Valve Internals	SST, Bronze and Coated Steel	SST 316, HASTELLOY, SMO, DUPLEX
Spring	SST 302	SST 316, INCONNEL
Diaphragm	Nylon fabric reinforced EPDM (WRAS and NSF approved)	NBR
Seals	NBR (Buna-N)	EPDM Viton
Coating	Polyester RAL 5010	FBE RAL 5010 Polyester RAL3000 (fire red) UV protected FBE RAL3000 Rilsan (Nylon) Halar
Control Trim: Fittings and control devices	Brass	SST 304 SST 316
Control Trim: Tubes	Reinforced, heavy-duty Nylon, Polypropylene	Copper SST 316

Note: The Beeco ACV valves in all sizes, meet the USA amendment for reducing lead in drinking water marked as S.3874 dated 01.05.2010.

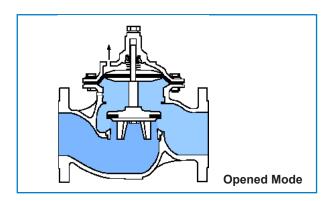
Basic Valve Operating Modes On-Off Mode

Standard (Single Chamber) Valve

Closed Mode: The control pressure (taken from the pipeline) is applied by the control device to the control chamber (top of the diaphragm). The pipeline pressure pushes the seal to open, and the control chamber pressure forces the diaphragm to close. Since the diaphragm area is larger than the seal area, it has greater hydraulic force so the valve remains in the closed position.



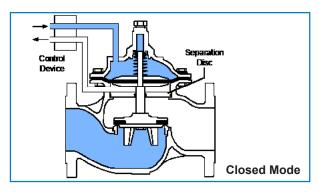
Open Mode: The control device relieves the pressure from the control chamber. The pipeline pressure forces the seal to the "open" position so that the fluid can pass through the valve. While the valve is open, outlet pressure is applied to the lower side of the diaphragm, assisting the opening.



Double Chamber Valve (Version D)

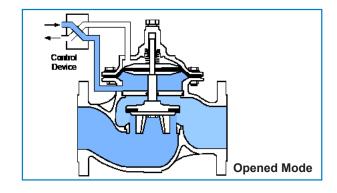
The double chamber version is created by inserting a separation disc between the diaphragm and the seal. This assembly creates a second control chamber below the diaphragm, permitting for the activation of the valve in low-pressure systems and enabling the activation faster valve response. The response to varying conditions is quick, since closure downward movement is not resisted by pressure below the diaphragm. The closure pace of the double chambered valve tends to slow toward the end of the closure procedure. This feature reduce the danger of pressure surges in short pipelines.

Closed Mode: The control pressure (taken from the pipeline or from supplementary pressure source) is applied to the top of the external diaphragm. The bottom control chamber drains. The pipeline pressure pushes the seal to open, but since the diaphragm area is larger than the seal area it creates greater hydraulic force and which forces the valve to close thus the valve closes. At this stage, the bottom chamber should be drained.



Open Mode: The control device releases the pressure from the top control chamber.

The seal assembly is forced to the "open" position by the pipeline pressure, allowing flow through the valve.



Modulating Mode

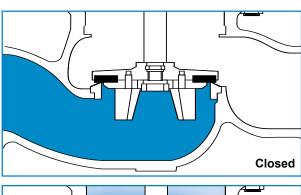
General

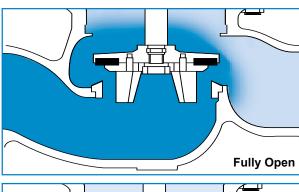
Positioning the seal a short distance (less than 1/4 of the seat diameter) from the seat, creates friction and turbulence, causing energy loss in the fluid passing through the valve. The results are:

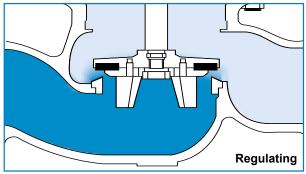
- Reduction of pressure and flow rate.
- Increase of inlet pressure.

The position of the seal assembly is dictated by the volume of control fluid in the top control chamber, which is determined by the control device. The control device is operated by hand (manual control), by electric current (solenoid valve), or by hydraulic pressure (pilot valves, hydraulic relays). All can be used in standard (single chamber) valves as well as in double chamber valves.

Modulating mode in standard (single chamber)

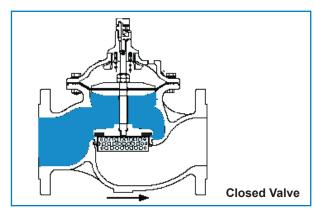


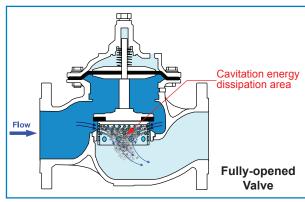




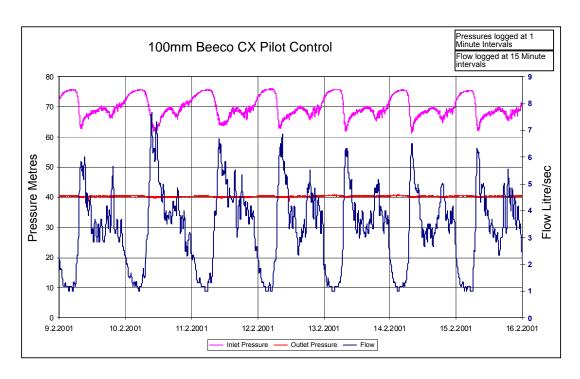
Regulation at high pressures difference

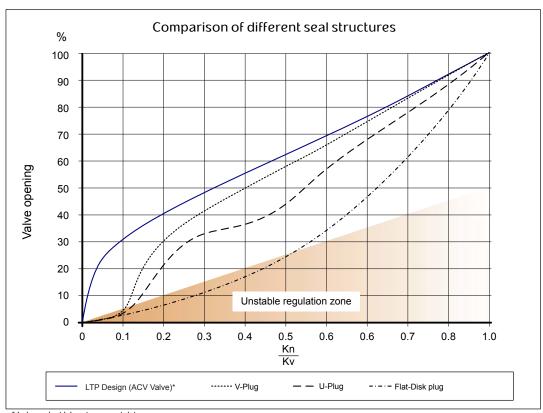
The ACV has exceptional resistance to damages. caused bv cavitation conditions. This was certified by extensive tests, carried by an US independent laboratories in and Europe. The operation limits, as found in these tests, can be calculated for any specific location- using a simple computer program (supplied on request). For operation conditions that exceed the safe limita special Cavitation-Free valve can be supplied. This version, marked by the addition "ANTI-CAV" after any ACV part number, can operate at any pressure differential without being ruined by it. The internal structure includes a Stainless Steel, perforated cylinder, that is connected below the standard seal disc and moving freely inside the seat. The valve is assembled to generate "over the seat" flow, so the water stream enters the cylinder from its external side and emerges through the internal side. The energy is dissipated by the high-velocity, turbulent flow through the exposed holes above the seat (due to varying trim position). The pressure recovery, that is the cause of cavitation damage, happens now inside the cylinder and not adjacent to the body wall. As the SST material is highlyresistant to cavitation- it is not damaged.





Typical Pressure Reducing Performance Chart



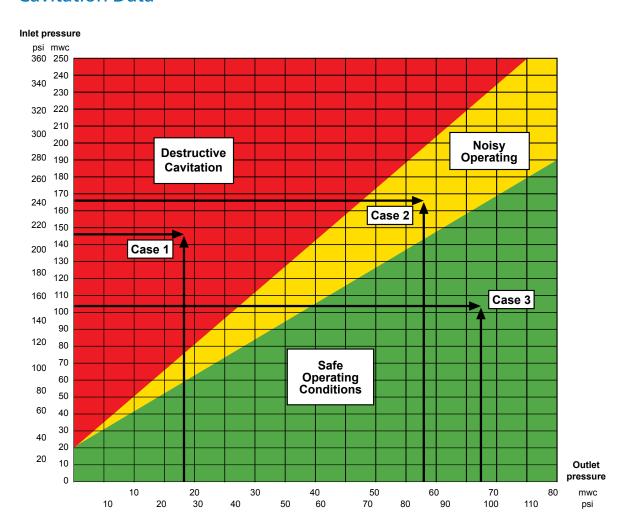


^{*} Independent laboratory report data source



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Cavitation Data



Cavitation Chart

Limits of operating conditions

The chart above sets the safe limits for valves that are supposed to operate at a considerable pressure differential. Such conditions generate noise and possible cavitation damages to the valve body. How to use the chart:

- i. Determine the maximal dynamic pressure that may be applied in the inlet of the valve.
- ii. Draw an horizontal line from the pressure scale at the left side of the chart
- iii. Find the requested outlet pressure in the pressure scale at the bottom of the chart.
- iv. Draw an upward line at this point.
- v. The intersection of the two lines defines the cavitation characteristics of the valve operation.
 - In the case that it falls in the RED zone (case I)- the valve may be damaged in a fairly short time.
 - In the case that it falls in the YELLOW zone (case II)- the valve may generate a noise that exceeds 80db.
 - In the case that the intersection is within the GREEN zone (case III)- the valve will perform safely and quietly

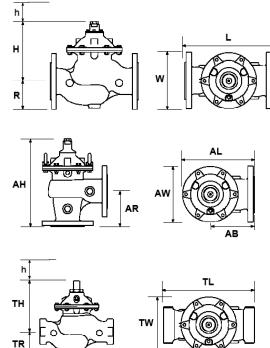
General remark: The cavitation and noise data are based on tests done by the Utah State University, US, and Delft Hydraulic Laboratories, Holland.



Dimensions & Weights

Models ACV-HF (rated up to 250psi) and Models ACV-HF-HP (rated up to 360psi)

Globe Flan	Globe Flanged Type														
Valve Size	40 (1	1/2")		50 (2"	')	65 (2 ¹ / ₂ ")	80 ((3")	3") 100 (4")			(6")		
	mm	inch	n	nm in	ich	mm	inch	mm	inch	mm	inch	mm	inch		
L	230	$9^{1}/_{16}$	2	30 9	1/16	292	12 ¹ / ₂	310	$12^{3}/_{16}$	350	133/4	480	187/8		
Н	185	$7^{5}/_{16}$	1	85 7	5/16	185	75/16	230	$9^{1}/_{16}$	240	97/16	330	13		
h**	140	$5^{1}/_{2}$	1		1/2	140	51/2	170	$6^{11}/_{16}$	180	7	230	9		
W	153	6	1	70 6 ¹	1/16	185	73/16	200	$7^{7}/_{8}$	235	91/4	330	13		
R	82.5	$3^{1}/_{4}$	82	2.5 3	1/4	92.5	35/8	100	$3^{15}/_{16}$	110	45/16	142.5	55/8		
Weight Kg/lbs*	12 /	26		12 / 26	6	13	/ 29	22 /	49	37	/ 82	80	/ 176		
Vol.control chamber lit/gal	0.1/	0.02	(0.1 / 0.02		0.1	0.02	0.3 /	0.08	0.7	/ 0.2	1.5	/ 0.4		
Valve Size	200	0 (8")		250 (*		")	300	(12")	35	0 (14	')	400 (16")		
	mm	incl	ı	mm	ir	nch	mm	inch	mm	in	ch	mm	inch		
L	600	235/	8	730	30 283/4		850	337/16	980	38	9/16	1100	435/16		
Н	390	15 ³ /	8	520	2	01/2	635	25	635	5 2	25	855	335/8		
h**	300	1113/	16	390	1	5 ¹ / ₄	450	1711/16	450) 17	11/16	590	231/4		
W	415	16 ⁵ /	16	525	20)11/16	610	24	610		24	850	$33^{7}/_{16}$		
R	172.5	63/2	1	205	8	1/16	230	9	272	2 10	11/16	290	$11^{7}/_{16}$		
Weight Kg/lbs*	157	/ 346		245	45 / 540		405	/ 893	51	510 / 1124		822 / 1812			
Vol.control chamber lit/gal	4.3	3 / 1.1		9.7 / 2.6			18.6	/ 4.9	18	18.6 / 4.9			50 / 13.2		
Valve Size	450	(18")		500	(20	")	600	(24")	70	0 (28'	')	800 (32")		
	mm	incl	ı	mm	ir	nch	mm	inch	mm	in	ch	mm	inch		
L	1200	471/	4	1250	49	93/16	1450	571/16	165	0 64	15/16	1850	727/8		
Н	855	335/	8	855	3	35/8	1574	6115/16	167	5 65	15/16	1675	6515/16		
h**	600	235/	8	600	2	35/8	740	291/8	860	33	37/8	860	$33^{7}/_{8}$		
W	850	337/	16	850	33	37/16	1100	435/16	110	0 43	5/16	1090	$42^{15}/_{16}$		
R	310	123/	16	357.5	14	41/16	490	195/16	498	3 19) ⁵ / ₈	603	233/4		
Weight Kg/lbs*	945	/2083	-	980	/ 210	60	1950	/ 4299	207	70 / 45	60	2600 / 5730			
Vol.control chamber lit/gal	50	/ 13.2		980 / 2160 50 / 13.2			84 /	22.2	84	84 / 22.2			84 / 22.2		



Angle Type

Valve Size	50	(2")	80	(3")	100 (4")		150 (6")		200 (8")		250	(10")
	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch
AL	208	83/16	250	913/16	295	11 ¹ / ₁₆	405	16	505	19 ⁷ / ₈	585	23
AH	240	9 ⁷ / ₁₆	415	16 ⁵ / ₁₆	445	171/2	570	227/16	635	25	832	323/4
AW	170	611/16	200	77/8	235	91/4	330	13	415	16 ⁵ / ₁₆	495	19 ¹ / ₂
AR	107	43/16	138	5 ⁷ / ₁₆	147	5 ¹³ / ₁₆	180	71/16	302	11 ⁷ / ₈	338	135/16
AB	125	415/16	150	5 ⁷ / ₈	173	613/16	240	97/16	300	11 ¹³ / ₁₆	338	135/16
Weight kg/lbs*	12	/ 26	20	20 / 44		37 / 81		76 / 167		150 / 330		/ 234

^{*} Approximate shipping Weight (PN 25) ** h = Minimal required maintenance space

Globe Threaded Type

Valve Size	40 (1 ¹	/ ₂ ") TH	50 (2") TH			
	mm	inch	mm	inch		
TL	215	87/16	215	87/16		
TH	185	75/16	185	75/16		
h	140	51/2	140	51/2		
TW	129	5	129	5		
TR	62	23/8	62	23/8		
Weight kg/lbs*	7 /	15	7 /	15		

End Connections (for PN16 or PN25) ISO 2084, 2441, 5752 ANSI B16, AS2129, JIS B22

Size Selection Table

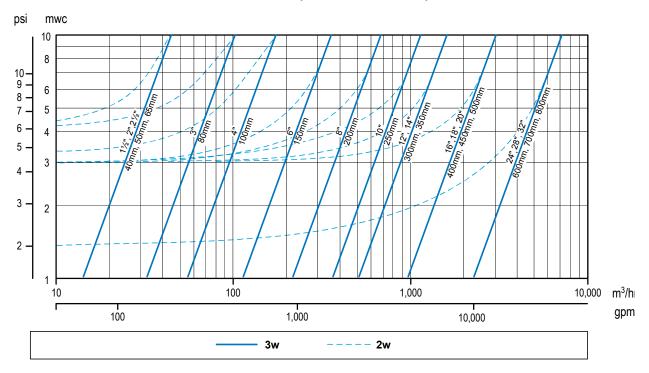
Size Selection rable																	
Valve	Size	40 (1 ¹ / ₂ ")	50 (2")	65 (2 ¹ / ₂ ")	80 (3")	100 (4")	150 (6")	200 (8")	250 (10")	300 (12")	350 (14")	400 (16")	450 (18")	500 (20")	600 (24")	700 (28")	800 (32")
Max. recommended for continuous opera		25	40	40	100	160	350	620	970	1400	1900	2500	3100	3600	5600	7600	8135
Max. recommended flow rate for continuous operation (Gpm)		110	180	180	440	700	1600	2800	4300	6200	8400	11000	13660	15800	24700	33500	35840
Min. recommended f	low rate								<1m ³ / _h (<5 gpm))						
Globe Type																	
Flow Rate Factor:	Kv (Metric) Cv (US)	43 50	43 50	43 50	103 120	167 195	407 475	676 790	1160 1360	1600 1900	1600 1900	3000 3500	3150 3700	3300 3860	7000 8200	7000 8200	7000 8200
Head Loss Factor I	2.2	5.4	15.4	6.7	5.6	4.8	5.5	4.5	5	9	3.8	6	5.9	4.2	7.8	13.4	
Angle Type																	
Flow Rate Factor: Kv (Metric) 60 60 140 190 460 770 1310 For head Loss of fully open valves use the follo							• .										

Head Loss Factor K (dimensionless) 2.8

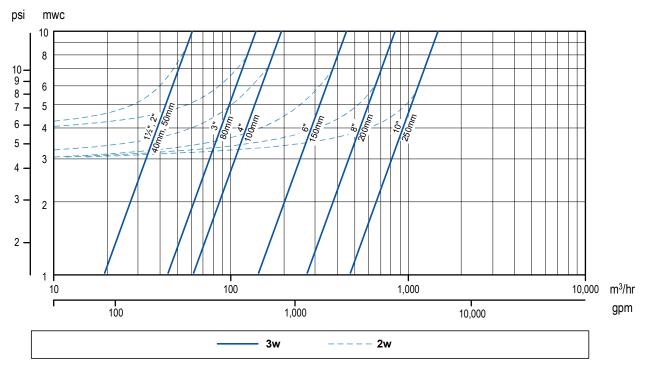
 $H (Bar) = \left(\frac{Q [m^3/h]}{Kv}\right)^2 \mid H (Psi) = \left(\frac{Q [gpm]}{Cv}\right)^2 \mid H = K \frac{V^2}{2g}$



Headloss Charts Models ACV-HF and ACV-HF-HP (Globe Pattern) Pressure Loss Chart



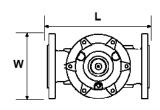
Models ACV-HF-AN/ACV-HF-HP-AN (Angle Pattern) Pressure Loss Chart

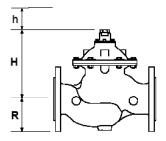


Dimensions & Weights Model ACV (rated up to 360psi)

Globe Flanged Type

	Makes Circ. 00 (011) 400 (411) 450 (011) 000 (011) 050 (4011)												
Valve Size	80	(3")	100	(4")	150	(6")	200	200 (8")		(10")			
	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch			
L	310	12 ³ / ₁₆	350	13 ³ / ₄	480	18 ⁷ / ₈	600	235/8	730	283/4			
Н	185	71/4	232	93/16	250	10	334	13 ¹ / ₈	395	15 ¹ / ₂			
h**	107	41/4	156	61/8	170	63/4	220	811/16	275	1013/16			
W	200	77/8	235	91/4	300	11 ³ / ₄	360	14 ³ / ₁₆	425	16 ³ / ₄			
R	100	315/16	120	411/16	150	5 ⁷ / ₈	182	6 ³ / ₁₆	215	87/16			
Weight Kg/lbs*	15	/ 33	27 / 60		51 / 112		92 /	202	171	377			
Vol.control chamber lit/gal	0.1 /	0.02	0.3 / 0.08		0.7 / 0.2		1.5 /	0.37	4.3	/ 1.1			
Valve Size	300	(12")	350	(14")	400 (16")		450	(18")	500 (20")		600 (24")		
	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	
L	850	337/16	980	389/16	1100	435/16	1200	47 ¹ / ₄	1250	493/16	1259	499/16	
Н	545	211/2	635	25	635	25	855	335/8	855	335/8	1311	51 ⁵ / ₈	
h**	400	15 ³ / ₄	480	18 ⁷ / ₈	480	18 ⁷ / ₈	600	235/8	600	235/8	245	95/8	
W	489	19¹/₄	610	24	628	243/4	850	337/16	850	33 ⁷ / ₁₆	881	3411/16	
R	245	93/8	260	10 ³ / ₁₆	314	12 ³ / ₈	310	12 ³ / ₁₆	357.5	14 ¹ / ₁₆	459	18 ¹ / ₁₆	
Weight Kg/lbs*	330	726	510 /	1124	544 / 1197		945 / 2083		980 / 2160		1030 / 2266		
Vol.control			18.6 / 4.9		18.6 / 4.9		50 / 13.2		50 / 13.2		50 / 13.2		



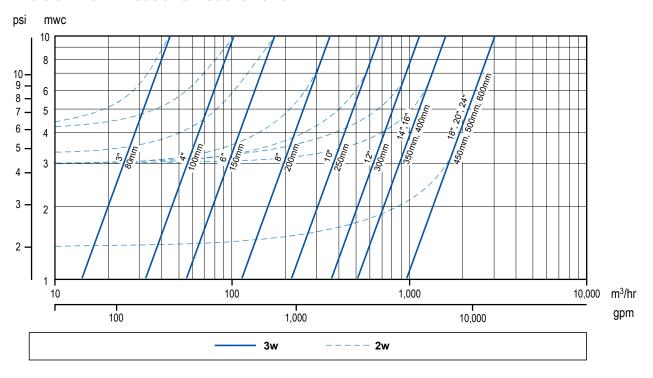


h* = minimal required maintenance space End Connections (for PN16 or PN25) ISO 2084, 2441, 5752 ANSI B16, AS2129, JIS B22.

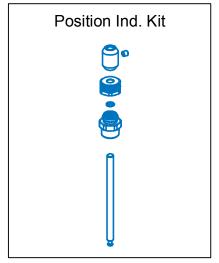
Size Selection Table

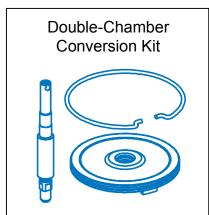
Valve Size		80 (3")	100 (4")	150 (6")	200 (8")	250 (10")	300 (12")	350 (14")	400 (16")	450 (18")	500 (20")	600 (24")
Max. recommended flow rate for continuous operation (m ³ / _h)		60	145	225	510	970	1400	1900	2030	3100	3600	3600
Max. recommended flow rate for continuous operation (Gpm)		265	640	990	2250	3990	6200	8400	8940	13660	15860	15860
Min. recommended flow	w rate					>1।	m³/h (>1 G	PM)				
Flow rate factor	Kv	43	115	165	345	663	1160	1600	1600	3000	3000	3000
	Cv	50	133	192	400	770	1360	1900	1900	3500	3500	3500

Model ACV Pressure Loss Chart

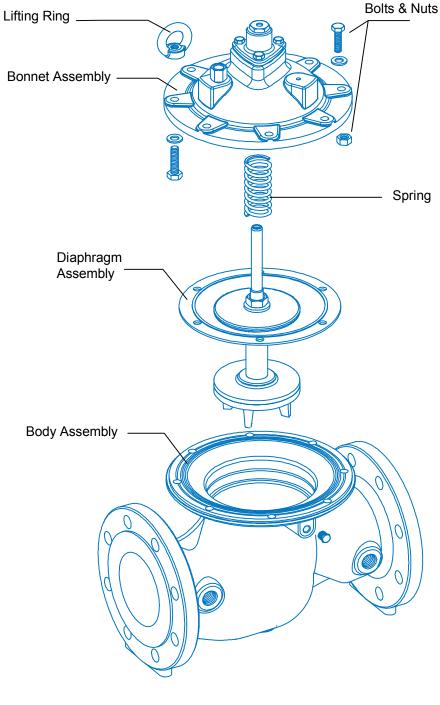


Components









Electronic and Remote control functions

EL Electrically- activated valve

Controlled by an electric solenoid valve, that initiates opening or closure of the main valve. The electric control can be added to most other control applications.

EC Electronically- controlled valve

Activated by the versatile BEECO "ConDor" controller, that enables all control functions, or combination of functions, at extreme accuracy. Can be controlled by any pulse- activating controller.







Pressure Regulating functions

PR Pressure Reducing valve

Reduces high upstream pressure to a steady, lower downstream pressure, regardless of fluctuations in the values of upstream-pressure or rate of flow. Should downstream pressure exceed the required set point (due to stoppage of the flow in the pipeline), the valve closes drip tight. Beeco PR valve is also UL listed, for use in fire fighting systems. Optional Pressure Reducing applications:

- PRM(T2) Dual Set-Point, Timer-modulated pressure reducing valve
- PRM(FM) Electronically-Controlled, Flow-Modulated PRV
- PRM(HyMod) Hydraulically-Controlled, Flow-Modulated PRV
- PR(D) Differential Pressure Reducing valve

PS Pressure Sustaining valve

Assembled in the pipeline and modulates to maintain a steady pressure in the network upstream of its location.

Beeco PS valve is UL listed for use in fire-fighting systems. Optional Pressure Sustaining applications:

- PS(R) Pressure Sustaining\Relief valve
- · DI Differential- sustaining valve















Rate of Flow Regulating functions

FR Flow-rate control valve

Maintains preset, stabilized flow rate in the network regardless of pressure variations and flow demand.

FE Rupture- protection valve

Normally- open in-line valve. Should the flow Rate exceed a preset point, due to pipe rupture, the valve closes automatically.

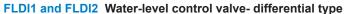


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Water Level Control

FL Water-level control valve- modulating type

Mounted on the tank / reservoir inlet, below or above the water level. Closes when the water level rises to the float location, preventing overflow, and opens when the water level drops.



Mounted on the tank / reservoir inlet, below or above the water level. It closes when the water rises to the requested maximal level, and opens when the water level drops to a preset minimal point. The levels difference is adjustable.

AL Altitude control valve

Mounted on the inlet of the tank / reservoir, below the water level . The valve is activated by the hydrostatic pressure of the water level. It closes when the water rise to the requested maximal level, and opens fully when the water level drops to the preset minimal point. The differential between the water levels is adjustable.

FLEL Electrically- activated level control valve

Mounted on the tank / reservoir inlet, below or above the requested water level.

Activated by An Electric Float pilot located in the tank / reservoir. It closes when the water rise to the requested maximal level, and opens fully when the water level drops to the preset minimal point. The differential between the water levels is adjustable.

AL / PR, FLDI1 / PR, FLDI2 / PR Combination of water level and flow rate control

Mounted on the tank / reservoir inlet. It limits the flow into the tank, and maintain the preset maximal and minimal water levels.

AL / PS, FLDI1 / PS, FLDI2 / PS Combination of water level and back-pressure control

Mounted on the tank / reservoir inlet. It maintains the pressure in the supply network and the preset maximal and minimal water levels.





FD



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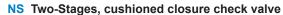
AF

Pumping Systems Control and Water Hammer / Surge Protection

CV Check valve

The valve is in "open" position when inlet pressure is higher than outlet pressure.

The valve closes, preventing returning flow, on inverted flow direction.



Developed to eliminate pressure slam of check valves, frequently found in roof-tank filling pumps of high-rise buildings. It opens on pump start, and closes at controlled pace when the pump stops.

BC Pump control valve

Installed on the pump discharge. Eliminating pressure surges caused by rapid change of the pipe velocity. Opens slowly on the pump startup, and closes at adjustable pace before shut-off. The pump motor is then switched-off by an electric interlink with the valve.

Optional Pump Control valve applications:

- BC/PS Pump control and Back-pressure sustaining valve
- · BC/CD Pump control valve with extended closure, for long pipelines
- BC/DI Booster pump control, maintains constant flow at varying suction conditions

DW Deep well control valve

Mounted on a tee junction, on the discharge head of deep well, upstream of the Check valve. Eliminating pressure surges caused by sudden change of the pipe velocity through start-up and shut-off.

QR Quick-Relief Safety valve

Mounted on a tee junction in the pipeline, releasing the water out of the network

When upstream pressure exceed the safe value- the valve opens instantly, releasing the pressure surge.

RE Surge-anticipating valve, Hydraulic activation

Mounted on a Tee junction, in a discharge pipe of a pumping station. Protecting the pumping and the network systems from water hammer, generated by power failure, by releasing the returning wave from the system. The valve is activated by the initial low-pressure wave.

RE/EL Surge-anticipating valve, Electric activation

Mounted on a Tee junction, in a discharge pipe of a pumping station. Protecting the pumping and the network systems from water hammer, generated by power failure, by releasing the returning wave from the system. The valve is activated electrically by the power failure event.

SP Surge-preventing closure

A unique BEECO control module, that can be added to any automatic valve. It prevents water hammer, that is generated by the valve closure, when it is located at the end of a long pipeline.



















The Beeco UL Deluge Valves are suitable for systems that include Electric, Hydraulic or Pneumatic detections. The Beeco ACV Deluge Valves are activated by each signal or by combinations thereof. All applications are equipped with a manual emergency actuation valve and approved for use in Fire Protection Systems as Automatic Reset or Manual Reset Valves.



DF/FI

Monitor Valves

The Beeco ACV Monitor Valves are designed to open immediately as a response to Electric, Hydraulic, Pneumatic or manual activation. The valves use the line pressure to develop maximum power and do not need any external source of power.

The Beeco ACV Monitor Valves are designed to be activated locally or remotely.



U-DE/EL

Pressure Reducing Valves

The Beeco ACV UL Pressure Reducing Valves are hydraulically self-operating Diaphragm Valves that reduce High upstream pressure to Lower downstream pressure regardless of the upstream pressure fluctuation or unstable flow demand.

The Beeco ACV UL Pressure Reducing Valves are designed to maintain constant downstream pressure at all flow conditions.



PR/UL

Pressure Relief Valves

The Beeco ACV UL Pressure Relief Valves are designed to maintain constant pressure in the fire Protection System and prevent over pressure by relieving excess pressure back to the reservoir or vent to the atmosphere.

Additional information about the Beeco ACV Fire Protection applications can be found in the Beeco Fire Protection catalogue.



PS/III