



VC6936

NO/NC FLOATING CARTRIDGE/CAGE VALVE WITH POWER FAILURE REPOSITION

PRODUCT DATA



The VC6936 Fail Safe Floating Control Valve provides proportional control of hot or chilled water in commercial heating and cooling applications, such as unit ventilators. On a power failure, this patented actuator design drives the valve to the fail safe position, either fully open or closed according to the installer's wiring connections.

The VC6936 uses a microprocessor-controlled, low voltage stepper motor with a supercapacitor-based power supply capable of storing enough power to drive the valve to its fail safe position when 24V power is removed from the actuator.

The VC hydronic valve consists of a valve body and replaceable characterized cartridge assembly. When used with a Resideo VC6900 or VC7900-series actuator, the valve provides proportional flow control. Three-way bodies may use cam-operated cartridge travel to resist water hammer. Limit switches prevent motor overrun.

SPECIFICATIONS

The specifications following are nominal and conform to generally accepted industry standards. Resideo is not responsible for damages resulting from misapplication or misuse of its products.

Power:

24V, 50-60Hz; 12W. Class 2 circuit
18 VA maximum (during start up).

Control Signal: 24 Vac, 1.5mA Floating Signal (two mutually-exclusive momentary contacts for open and close, with minimum 0.5 seconds on and off timing.)

Annunciation: Red LED on cable end.

Nominal Control timing: 120 seconds full stroke

Electrical termination: 5 feet (1.5 m) plenum-rated cable per UL94-5V. Flexible conduit clamp (3/8") included.

Operating ambient temperature: 0 to 60 °C (32 to 140 °F)
5-95% RH (non-condensing)

Shipping & storage temperature: -40 to +65 °C (-40 to +150 °F)

Atmosphere: Non-corrosive, non-explosive.

Approvals:

UL (plenum rating), CE (pending)
FCC Part 15 Class B

Fluid temperatures: 1 to 95 °C (34 to 203 °F)

Pressure rating:

Static – 20 Bar (300 psi)
Burst – 100 Bar (1500 psi)

Operating pressure differential & close-off:
Max. – 4 Bar (60 psi)

Stem Travel: 10 mm (0.4 inches)

Flow Characteristics: Linear or equal percentage, per Table 2.

Models:

Actuator: VC6936ZZ11
Bodies: VCZ..., per Table 2.

Table 1. Series 60, 24 Vac Actuator.

Model Series	Voltage (50/60 Hz)	Nominal Stroke Timing	Electrical Connection
VC6936	24 Vac	120 seconds. Fail Safe: 12 Seconds	5' (1.5 m) plenum-rated cable

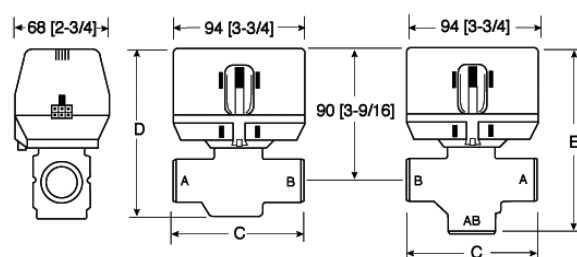


Fig. 1. Nominal Dimensions in inches and millimeters.



Table 2. Valve Sizes.

Dimension	C		D		E	
[4] Pipe Fitting Sizes	mm	inches	mm	inches	mm	inches
1/2" BSPP (int.) [2]	98	3-7/8	111	4-3/8	136	5-11/32
1/2" BSPT (int.)						
3/4" BSPP (int.)	94	3-11/16	113	4-7/16	130	5-1/8
3/4" BSPT (int.)						
3/4" BSPP (ext.)						
22mm Compression [3]	112	4-7/16	114	4-7/17	140	5-1/2
1" BSPP (int.)	94	3-11/16			136	5-11/32
1" BSPP (ext.)	95	3-11/17	113	4-7/16	137	5-11/33
1" BSPT (int.)	94	3-11/16			136	5-11/16
28mm Compression [3]	116	4/9/16			147	5-13/16
North America Standard Models						
3/8" Flare [1]	98	3-7/8	111	4-3/8	136	5-11/32
1/2" Sweat	89	3-1/2			130	5-1/8
1/2" Flare [1]	98	3-7/8			136	5-11/32
1/2" Inverted Flare [1]						
1/2" NPT (int.)						
3/4" NPT (int.)	94	3-11/16	113	4-7/16	130	5-1/8
3/4" Sweat					132	5-3/16
1" NPT (int.)					136	5-11/32
1" Sweat						
1-1/4" Sweat	110	4-5/16	118	4-5/8	142	5-5/8
1-1/4" NPT (int.)						

[1] No adapters

[2] Suitable for use as 15 mm compression fitting

[3] Dimensions shown with nuts and olives installed

[4] Some models not available in all countries

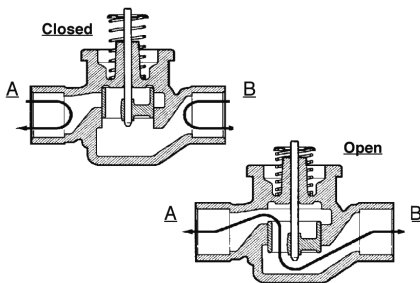


Fig. 2. Fluid flow of 2-way VC series valve

Table 3. 2-Way Valve Flow Capacity Ratings of Valves in Kv or Cv.

2-Way Valve Number	Cartridge [5] Pipe Fitting Sizes	1000	1100 [4]	1400	1500	1600
Nominal Kvs Rating [8]						
VCZAF	1/2" BSPP (int.) [2]	3.0	2.6	0.6	1.1	
VCZAB	1/2" BSPT (int.)		2.9			
VCZAJ	3/4" BSPP (int.)	5.3	4.5	3.3	0.7	1.3
VCZAK	3/4" BSPT (int.)					
VCZAH	3/4" BSPP (ext.)					
VCZAG	22mm Compression [3]	6.0	4.6	3.7		
VCZAP	1" BSPP (int.)		5.7	3.6		
VCZAQ	1" BSPP (ext.)		5.3			
VCZAT	1" BSPT (int.)		5.7			
VCZAN	28mm Compression [3]		5.4			

Table 3. 2-Way Valve Flow Capacity Ratings of Valves in Kv or Cv. (Continued)

2-Way Valve Number	Cartridge	1000	1100 [4]	1400	1500	1600
	[5] Pipe Fitting Sizes	Nominal Kvs Rating [8]				
	North America Standard Models	Nominal Cv Rating				
VCZAC	3/8" Flare [1]		2.1			
VCZAA	1/2" Sweat		3.2	2.9	0.7	1.3
VCZAD	1/2" Flare [1]		3.1			
VCZAE	1/2" Inverted Flare [1]		3.2			
VCZBB	1/2" NPT (int.)		3.4	2.9	0.7	1.3
VCZAL	3/4" NPT (int.)		4.7	3.9	0.8	1.5
VCZAM	3/4" Sweat		4.6			
VCZAR	1" NPT (int.)		6.6	4.2		
VCZAS	1" Sweat		6.2			
VCZBE	1-1/4" Sweat		7.0			
VCZBD	1-1/4" NPT (int.)					

Table 4. 3-Way Valve Flow Capacity Ratings of Valves in Kv or Cv.

3-Way Valve Number	Cartridge	6000	6100	6400	6500	6600
	[5] Pipe Fitting Sizes	Nominal Kvs Rating [8]				
VCZME	1/2" BSPP (int.) [2]	3.4	3.2			
VCZMN	1/2" BSPT (int.)		3.3			
VCZMH	3/4" BSPP (int.)	7.0	5.9			
VCZMJ	3/4" BSPT (int.)		5.3			
VCZMG	3/4" BSPP (ext.)	6.9	5.7			
VCZMF	22mm Compression [3]	7.1	5.9			
VCZMP	1" BSPP (int.)	7.7	6.4			
VCZMQ	1" BSPP (ext.)		6.8			
VCZMT	1" BSPT (int.)		6.9			
VCZMM	28mm Compression [3]		6.4			
North America Standard Models		Nominal Cv Rating				
VCZMB	3/8" Flare [1]		2.7			
VCZMA	1/2" Sweat		3.8			
VCZMC	1/2" Flare [1]					
VCZMD	1/2" Inverted Flare [1]		4.2			
VCZNB	1/2" NPT (int.)		3.7			
VCZMK	3/4" NPT (int.)		6.6			
VCZML	3/4" Sweat		5.9			
VCZMR	1" NPT (int.)		8.6			
VCZMS	1" Sweat		6.6			
VCZNE	1-1/4" Sweat		8.6			
VCZND	1-1/4" NPT (int.)					
FLOW CHARACTERISTIC		Quick Open	Linear	Equal Percentage		
APPLICATION		On-Off			[7]	
		[6]	Modulating			

[1] No adapters

[2] Suitable for use as 15 mm compression fitting

[3] Includes compression nuts and olives

[4] "1200" series cartridge has the same Cv/Kv rating as "1100" series. Suitable for use in potable water applications.

[5] Model availability is country specific. Some models are not available in all countries

[6] Can be used for modulating with appropriate software

[7] Use balancing valve for very low flow on-off applications

[8] Multiply the Kv rating by 1.167 to obtain Cv rating

Example: 2-way, 3/4" BSPT (internally threaded) valve number

VCZAJ1400 has a Kv rating of 3.9; 3-way 1/2" Sweat valve number VCZMA6100 has a Cv rating of 3.8.

INSTALLATION

When Installing This Product...

1. Read these instructions carefully. Failure to follow them could damage the product or cause a hazardous condition.
2. Check the ratings given in the instructions and on the product to make sure the product is suitable for your application.
3. Installer must be a trained, experienced service technician.
4. Always conduct a thorough checkout when installation is completed.
5. While not necessary to remove the actuator from the body, it can be removed for ease of installation. The actuator can be installed in any of the four orientations to suit the most convenient wiring direction. Actuator latching mechanism works only when the lengths of the actuator and the valve body are parallel to each other.
6. An extra 1" (25 mm) head clearance is required to remove the actuator.

IMPORTANT

For trouble-free operation of the product, good installation practice must include initial system flushing, chemical water treatment, and the use of a 50 micron (preferably 5 micron) 10% side stream system filter(s). Remove all filter(s) before flushing. Limit flow through the filter to 5~10% of total system flow to prevent 'starving' the system. Ensure filter cartridge is changed frequently enough to prevent clogging.

Put the VC actuator manual lever in the manual open or the fully open (down) position to allow initial system flushing with the actuator mounted. This may be done without electrical hook-up. Alternatively, reusable flush caps, part # 272866B, may be purchased separately for use in initial flushing of dirty hydronic systems.

Do not use boiler additives, solder flux and wetted materials which are petroleum based or contain mineral oil, hydrocarbons, or ethylene glycol acetate. Compounds which can be used, with minimum 50% water dilution, are diethylene glycol, ethylene glycol, and propylene glycol (antifreeze solutions).

PLUMBING

The valve may be plumbed in any angle, but preferably not with the actuator below the horizontal level of valve body. Make sure there is enough room around the actuator for servicing or replacement. Refer to Installation and Instruction sheet 95C-10919 for valve installation instructions.

TO INSTALL ACTUATOR

Installation of a new actuator does not require draining the system provided the valve body and valve cartridge assembly remain in the pipeline. Wiring may be done either before or after the actuator is installed.

1. The actuator head is automatically latched to the valve. Align the coupling hole in the bottom of the actuator with the valve stem. Press the actuator down towards the body with moderate hand force and turn the actuator counter-clockwise by 1/8 turn (45°) to line up the actuator with the piping. See Fig. 3.

NOTE: The actuator can also be installed at right angles to the valve body but in this position the latch mechanism will not engage.

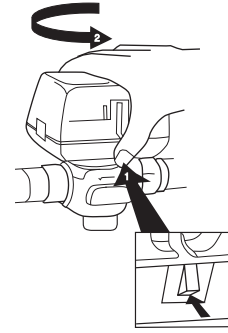


Fig. 3. Latch Mechanism to detach Actuator.

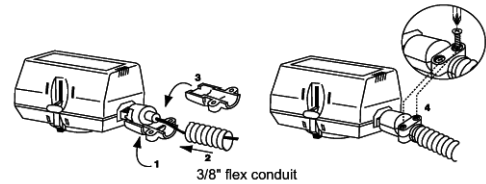


Fig. 4. Flexible Conduit Attachment.

WIRING

See Fig. 5 for single unit wiring details with a floating controller.

CAUTION

1. Disconnect power supply before connecting wiring to prevent electrical shock and equipment damage.
2. Never jumper the supply wires or actuator terminals even temporarily. This may damage the controller.
3. Verify wiring connections of the brown and blue lead wires with respect to the controller. The actuator will not operate if these are wrong. Inputs are switched from the "hot" side of the controller's power supply.
4. Multiple valves may be connected in parallel to a single controller and transformer, up to the current rating of the controller and transformer.

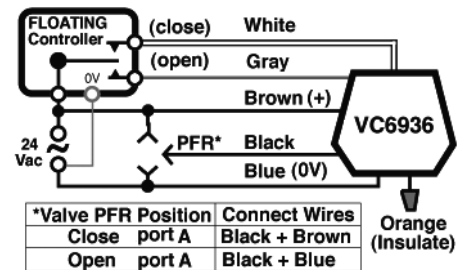


Fig. 5. Wiring color code for cable VC actuator, and Series 60 floating (Tristate) controller.

OPERATIONS

WITH SERIES 60 FLOATING (TRISTATE) CONTROLLER (refer to Fig. 5)

The series 60 floating controller is an SPDT contact closure outputs with a centre-off position. On a change in temperature from the set point, the controller will close either the Open or Close contacts, creating a momentary voltage pulse on the gray or white input leads, driving the valve to a new position. The pulse must be at least 1/2 second long in order to be detected by the VC6936. The pulse can be held as long as necessary.

For control stability, the stroke time of the actuator while powered has been simulated at 120 seconds. In fail safe and testing operation, the actuator travels through its stroke in 12 seconds.

POWER FAILURE REPOSITION (FAIL SAFE OPERATION)

On a loss of power, the actuator will drive to its stand-by position using energy stored in the super capacitors, and will resume normal operation on power up. On loss of signal, a VC6936 wired for PFR-Open will open the A port fully. A VC6936 wired for PFR-Close will close the A port. The motor can drive the valve through its full stroke in 12 seconds.

PFR position is chosen during installation. The black wire is connected to common (blue) to fail safe open, or to 24 V (brown) to fail safe closed.

The PFR position can be controlled dynamically with a SPST signal by applying 24V power to the PFR direction selection lead while power is present. Applying 24V will cause the valve to close the A port when power is lost. Not applying power will cause the valve to open the A port when power is lost. This can be useful in 2-pipe systems where both hot and chilled water maybe used depending on the season, and a different fail safe mode is required for each condition.

Because of the soft close off characteristic of the VC valve, initial (and final) movements of the actuator do not cause significant changes in the valve stem position.

START UP

On initial power-up, the capacitors will take about 60 seconds to charge. The LED will flash slowly during this period. When ready, the actuator will drive the valve through one full stroke cycle over 24 seconds to calibrate its position, and exercise the valve cartridge, the LED will glow steadily.

This self-calibration action repeats daily. If anything interferes with the self-calibration process, the LED will flash rapidly and the actuator will not respond to control signals.

CHECKOUT

1. Raise the set point of the thermostat above room temperature to initiate a call for heat, if the valve is wired for heating control.
2. Observe all control devices – 2 way valve should open or port A in 3 way valve should open, and port B should close in 120 seconds.
3. Lower the set point of the zone thermostat below room temperature.
4. Observe the control devices. 2 way valve should close or port A in 3 way valve should close, and port B should open in 120 seconds.
5. Remove power from the actuator. The VC6936 waits 3 seconds then drives valve to its fail safe position, e.g.: open, in 12 seconds or less.
6. Restore power to the actuator. Valve should drive to the position required by the thermostat or controller in 120 seconds or less.

SERVICE

This valve should be serviced by a trained, experienced service technician.

1. If the valve is leaking, drain system OR isolate valve from the system. Do not remove body from plumbing.
2. Check to see if the cartridge needs to be replaced.
3. If the motor or other internal parts of the actuator is damaged, replace the entire actuator assembly.

NOTE: Resideo hydronic valves are designed and tested for silent operation in properly designed and installed systems. However, water noises may occur as a result of excessive water velocity. Piping noises may occur in high temperature (over 212 °F [100 °C]) systems with insufficient water pressure.

TO REPLACE ACTUATOR

Replacement of an actuator does not require draining the system, provided the valve body and valve cartridge assembly remain in the pipeline.

1. Check replacement part number and voltage ratings for match with old device.
2. Disconnect power supply before servicing to avoid electrical shock or equipment damage.
3. Disconnect leadwires to actuator and remove. Where appropriate, label wires for rewiring.
4. The actuator head is automatically latched to the valve. To remove, press up on the latch mechanism with your thumb. It is located directly below the white manual open lever (see Fig. 3). Simultaneously press the actuator down towards the body with moderate hand force and turn the actuator counter-clockwise by 1/8 turn (45 degrees). Lift the actuator off the valve body.
5. Install the new actuator by reversing the process in (4).
6. Reconnect leadwires.
7. Restore power, and check out operation.



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