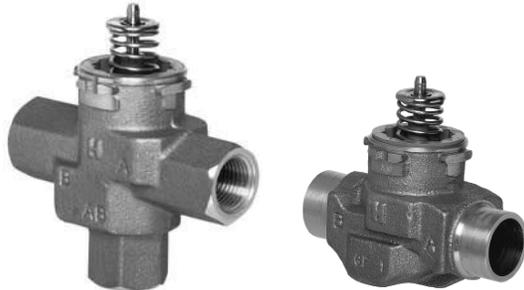




# VCA, B, M and N Series

## CARTRIDGE VALVE FOR USE WITH VC SERIES ACTUATORS

### INSTALLATION INSTRUCTIONS



The VC hydronic valve consists of a valve body and replaceable characterized cartridge assembly.

Depending on the valve model selected, they can be used with a VC2114 or VC8114 series actuator to provide on-off flow control, or with a VC6930 or VC7930 series actuator to provide proportional flow control. Two way bodies may be plumbed in either direction. Three-way bodies may be used in either diverting or mixing applications.

Replacing the cartridge rebuilds the valve. The valve body should be able to stay in the pipes indefinitely.

VC actuators, ordered separately, use cam-operated cartridge travel to resist water hammer. Limit switches prevent motor overrun.

## SPECIFICATIONS

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

**Operating ambient temperature:**

32 to 150 °F (0 to 65 °C)  
5-95% RH (non-condensing)

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

**Atmosphere:** Non-corrosive, non-explosive.

**Valve Materials:** Body of brass, Cartridge of Ryton® (polyphenylene sulphide), Noryl® (polyphenylene oxide), and Fortron  
O-ring seals of EPDM rubber  
Stem of stainless steel.

**Pressure rating:**

Static – 300 psi (20 Bar)  
Burst – 1500 psi (100 Bar)  
Operating Differential and Close-off – 60 psi maximum (4 bar)

**Stem Travel:** 0.4 inches (10 mm)

**Flow Characteristics:** Linear or equal percentage, per Table 1.

**Accessories:**

- 40007029-002: Wrench for removing VC cartridge
- VCZZ1100: 2-way linear flow characteristic cartridge
- VCZZ1400: 2-way equal percentage cartridge
- VCZZ1500: 2-way equal percentage cartridge, very low Cv
- VCZZ1600: 2-way equal percentage cartridge, low Cv
- VCZZ6100: 3-way linear flow characteristic cartridge
- 272866B: Flush caps for system cleaning, 10 per pack

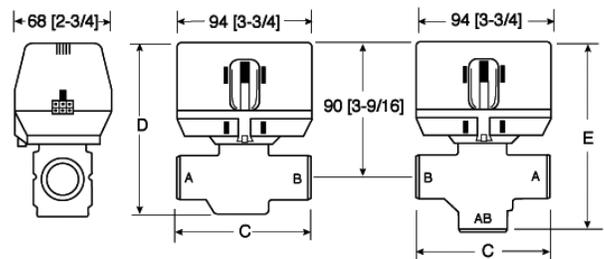


Fig. 1. Nominal Dimensions in inches and millimeters

**Models:**

Bodies: VCA, B, M, N..., (See Table 1)  
Actuators: Order Separately

Table 1. VC Valve Assembled Dimensions

Dimension [4] Pipe Fitting Sizes	C		D		E	
	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]						
1" BSPP (int.)	94	3-11/16	114	4-7/17	136	5-11/32
1" BSPP (ext.)						
1" BSPT (int.)	94	3-11/16	113	4-7/16	136	5-11/16
28mm Compression [3]						
28mm Compression [3]	116	4/9/16			147	5-13/16



**Table 1. VC Valve Assembled Dimensions (Continued)**

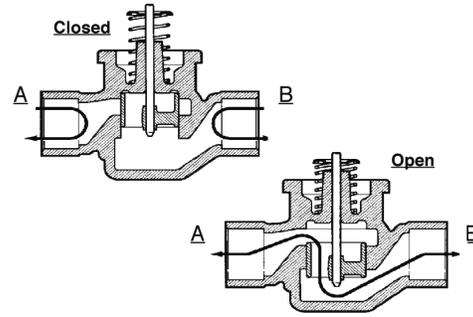
Dimension [4] Pipe Fitting Sizes	C		D		E	
	mm	inches	mm	inches	mm	inches
<b>North America Standard Models</b>						
3/8" Flare [1]	98	3-7/8	111	4-3/8	136	5-11/32
1/2" Sweat	89	3-1/2			130	5-1/8
1/2" Flare [1]	98	3-7/8	111	4-3/8	136	5-11/32
1/2" Inverted Flare [1]						
1/2" NPT (int.)	94	3-11/16	113	4-7/16	130	5-1/8
3/4" NPT (int.)						
3/4" Sweat	94	3-11/16	113	4-7/16	132	5-3/16
1" NPT (int.)						
1" Sweat	110	4-5/16	118	4-5/8	136	5-11/32
1-1/4" Sweat						
1-1/4" NPT (int.)	110	4-5/16	118	4-5/8	142	5-5/8

- [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**

**Table 2. VC Series Valve Bodies**

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.)	5.3	4.5		0.7	1.3
VCZAG	22mm Compression [3]			4.6		
VCZAP	1" BSPP (int.)	6.0	5.7	3.6	0.7	1.3
VCZAQ	1" BSPP (ext.)		5.3			
VCZAT	1" BSPT (int.)	6.0	5.7			
VCZAN	28mm Compression [3]		5.4			
<b>North America Standard Models</b>		<b>Nominal Cv Rating</b>				
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	0.8	1.5
VCZAS	1" Sweat		6.2			
VCZBE	1-1/4" Sweat		7.0	4.2	0.8	1.5
VCZBD	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.



**Fig. 2. Fluid flow of 2-way valves**

**Table 3. VC Series Valve Bodies**

3-Way Valve Number	Cartridge [5] Pipe Fitting Sizes	6000	6100	6400	6500	6600
		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.)	7.7	6.9			
VCZMM	28mm Compression [3]		6.4			
<b>North America Standard Models</b>		<b>Nominal Cv Rating</b>				
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			

- [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.

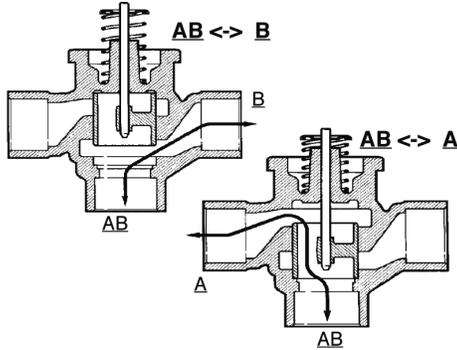


Fig. 3. Fluid flow of 3-way valves

## 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.



### CAUTION

Disconnect power supply before connecting wiring to prevent electrical shock and equipment damage. On 24V systems, never jumper the valve coil terminals, even temporarily. This may damage the thermostat.

### 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, including vertical piping, but preferably not with the actuator below horizontal level of the body. Make sure there is enough room around the actuator for servicing or replacement

For use in diverting applications, the valve is installed with the flow water entering through bottom port AB, and diverting through end ports A or B. In mixing applications the valve is installed with inlet to A or B and outlet through AB.

Mount the valve directly in the tube or pipe. Do not grip the actuator while making and tightening up plumbing connections. Either hold valve body in your hand or attach adjustable spanner (38 mm or 1-1/2") across hexagonal or flat faces on the valve body (Figure 4).

If assembling valve train on a bench, take care not to deform body with vice. Do not place the raised "H" logo between the jaws of the vice. Excess jaw force can deform the body.

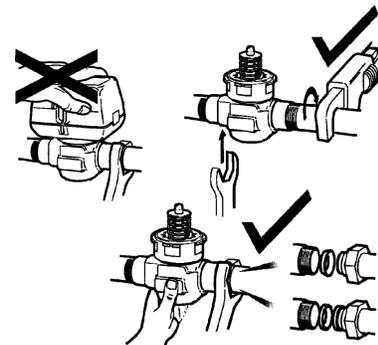


Fig. 4. Plumbing of the VC Valve

## COMPRESSION MODELS

For compression fitted models, tighten the compression nuts enough to make a watertight seal. TAKE CARE NOT TO OVER TIGHTEN. Maximum torque limit is 33 ft-lb for the 22 mm compression fitting, and 48 ft-lb for the 28 mm compression fitting.

## SWEAT MODELS

On sweat fitted valves, the cartridge is shipped loose to avoid being damaged during the solder operation.

1. Remove valve actuator from body and solder the connecting pipes in accordance with normal soldering practices.
2. After soldering and valve has cooled, remove cartridge assembly from plastic bag, insert into the valve body and tighten down with enclosed wrench until it bottoms out. DO NOT OVER TIGHTEN (maximum torque is 40 in-lb). See Figure 5.
3. Replace valve actuator.

## TO REPLACE CARTRIDGE (IF REQUIRED)

Two-way cartridges fit all two-way bodies. The Cv rating of a valve can be changed by replacing the cartridge, allowing for unique combinations. Three-way cartridges fit all three-way bodies.

1. Disconnect power supply before servicing to avoid electrical shock or equipment damage.
2. Depending on the installation, it may be necessary to disconnect leadwires to valve actuator, or depress tab on Molex™ connector and remove. Where appropriate, label wires for rewiring.
3. Remove valve actuator by pressing up on the latch mechanism located directly below the red manual open lever with thumb (See Figure 5). Simultaneously press the actuator down towards the valve body with moderate hand force and turn the actuator counter-clockwise by 1/8 turn (45°). Lift actuator off the valve body.
4. To replace a cartridge, isolate flow to the valve using installed shut off valves or other service equipment designed for this purpose. Remove old cartridge with 40007029-002 wrench supplied with the replacement unit. It may be necessary to use pliers or other tools to remove the old cartridge due to calcium or dirt buildup in the valve body.
5. Clean the valve surfaces marked \* and \*\* in Figure 6 to ensure the new cartridge O-rings seal at these points. Use care to avoid damage to these surfaces (\*\* for 3-way valves only).

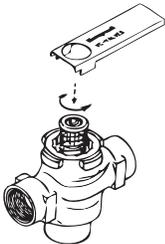


Fig. 5. Installing Cartridge

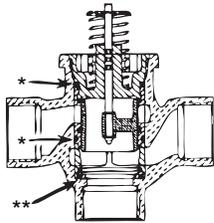


Fig. 6.

6. Remove the pre-lubricated cartridge assembly from its plastic bag. Thread it by hand into the valve body and tighten it down with the enclosed wrench until it bottoms out. **DO NOT OVER TIGHTEN:** maximum torque is 40 in-lb. (4.5 Nm). The top surface of the cartridge should be flush with the top edge of the body casting.
7. Replace valve actuator by following the procedure in the “To Install Actuator” section.
8. Reconnect leadwires or Molex™ connector if necessary.
9. Refill hydronic system or restore system flow by opening isolating valves.
10. Restore power, and checkout operation of cartridge in valve, making sure of no internal seat leakage or external body leakage.

Restore system pressure slowly to the valve to allow any trapped air to escape. Check for leaks. Re-install the actuator.

## TO INSTALL ACTUATOR

**NOTE:** 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.

Refer to the VC Actuator Installation and Instruction sheet for detailed wiring and checkout instructions.

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 degrees) to line up the actuator with the piping. The lock will click when engaged (See Figure 7).

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

2. Connect leadwires.
3. Restore power and check operations.

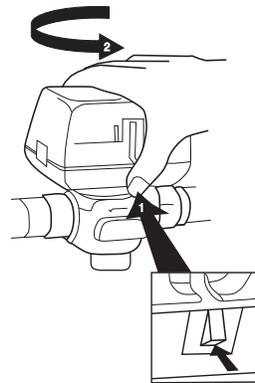


Fig. 7. Lock Mechanism to detach Actuator

## 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.



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