

## VC6800, VC6900 Series Floating Control Valves

PRODUCT DATA



### FEATURES

- All actuators are interchangeable and suitable for all valves, 1/2" through 1", providing maximum installation flexibility with minimum stocking requirements.
- A locking tab secures the actuator to the body of the valve.
- Multi-directional actuator mount allows for 4 different wiring orientations, thus providing ease of wiring and service.
- Actuator is constructed of moisture and humidity-resistant materials.
- Long service life because the actuator motor de-energises when not in motion.
- Manual opener and position indicator. This "manual opener" position may be used for filling, venting, and draining the system.
- Bayonet-mount for actuator head. Actuator can be installed after plumbing work has been completed, which makes for more efficient on-site installation.
- Body dimensions are comparable to existing Honeywell products (V4043/4044 and V8043/8044), and in most cases can be interchanged.
- Sweat-fitted valves are supplied with the cartridge loose, to facilitate soldering operations (an installation tool is included).
- In this balanced valve design, the internal piston moves up and down, across the water flow. The actuator provides sinusoidal piston travel action for "soft" shut-off and open, to eliminate water hammer in most applications.
- In 2-way valves, flow is bi-directional.
- In 3-way valves, flow can be mixing or diverting.

### GENERAL

The VC6800/VC6900 Series Modulating Control Valves provide optimum control of hot and/or chilled water flow in various heating and cooling applications, such as fan coil units, reheat coils and perimeter heating systems.

The VC hydronic valve consists of a valve body and replaceable characterized cartridge assembly. When used with a Honeywell VC6800/VC6900 series actuator, the valve provides linear flow in either diverting or mixing applications. They are designed to provide sinusoidal valve actuator travel, and therefore operate silently and resist water hammer.

Compatible with 24 Vac, 3-wire signal, the VC series valve actuator is used with either a single pole double throw two-position controller for on-off control, or a floating controller, for modulating control. These actuators have conformal coated printed circuit boards for humidity resistance. Through an internal switching mechanism, the actuator takes power only while driving the valve to the commanded position.

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## SPECIFICATIONS

**Table 1. Actuator Model Identifiers**

Model Series	Voltage (50/60Hz)	Auxiliary Switch	Nominal full open Time @ 60 Hz	Type of Electrical Connection
VC6830	24 Vac	SPDT	120 sec.	Molex
VC6831	24 Vac	SPDT	120 sec.	1 metre cable
VC6930	24 Vac	-	120 sec.	Molex
VC6931	24 Vac	-	120 sec.	1 metre cable
VC6940	24 Vac	-	12 sec.	Molex

\*\* Plenum rated cover & cable

**Table 2. Body Fitting Model Identifiers**

2-way Valve Number	Cv Rating	Body Fitting	3-way Valve Number	Cv Rating
AA11xx	3.2	1/2" Sweat	MA61xx	3.8
AC11xx	2.1	3/8" Flare	MB61xx	2.7
AD11xx	3.1	1/2" Flare	MC61xx	3.8
AE11xx	3.2	1/2" Inv. Flare	MD61xx	4.2
AF11xx	3.0	1/2" BSPP/15mm int	ME61xx	3.7
AB11xx	3.4	1/2" BSPT int	MN61xx	3.8
AM11xx	4.6	3/4" Sweat	ML61xx	5.9
AH11xx	5.2	3/4" BSPP ext	MG61xx	6.7
AJ11xx	5.2	3/4" BSPP int	MH61xx	6.9
AK11xx	4.7	3/4" BSPT int	MJ61xx	6.2
AL11xx	4.7	3/4" NPT int	MK61xx	6.6
AG11xx	5.4	22mm Compression*	MF61xx	6.9
AP11xx	6.6	1" BSPP int	MP61xx	7.5
AQ11xx	6.2	1" BSPP ext	MQ61xx	7.9
AS11xx	6.2	1" Sweat	MS61xx	6.6
AR11xx	6.6	1" NPT int	MR61xx	8.6
AT11xx	6.6	1" BSPT int	MT61xx	8.1
AN11xx	6.3	28mm Compression*	MM61xx	7.5

\*Includes compression nuts and olives

For example, to order a 120 second stroke timing actuator, with 1 meter cable and no auxiliary switch, on a 3-way 3/4" BSPP internal thread body, you would order VC6931MH6111. The last two digits, "11", indicate that the actuator comes with conformal coated printed circuit board.

## ORDERING INFORMATION

Before ordering please determine the following:

1. The body type: 2-way or 3-way
2. The actuator voltage : 24V/50-60Hz
3. The pipe fitting, size, and flow capacity rating (Cv) required.
4. Order Specification Number
5. Accessories, if desired.

If you have additional questions, need further information, or would like to comment on our products or services, please write or phone:

1. Your local Home and Building Control Sales Office (please check the white pages of your phone directory).
2. Honeywell Limited/Honeywell Limitée, 35 Dynamic Drive, Scarborough, ON M1V 4Z9.

In U.S.A. - Honeywell, 1885 Douglas Drive North, Minneapolis, Minnesota 55422-4386. International Sales and Service Offices in all principal cities of the world. Manufacturing in Australia, Canada, Finland, France, Germany, Japan, Mexico, Netherlands, Spain, Taiwan, United Kingdom, U.S.A.

**Voltage:**  
24V, 50-60Hz Model

**Colour coded label**  
Blue

**Power Consumption:**

4 Watts Max. at nominal voltage (during valve position change).

**Note:** Use 6 VA for Class 2 transformer and connection wire sizing. Maximum duty cycle 15%.

**End Switch Rating:**

2.2 A inductive from 5 to 110 Vac

1.0 A inductive above 110 to 277 Vac

Min. DC switching capability: 0.005 A @ 24 Vdc

**Note:** Use model V6831 only for mixed line and low voltage applications.

**Nominal Timing:**

See Table 1

**Note:** Timing is approximately 20% longer @ 50Hz

**Electrical Termination: 3 Versions Available:**

1) Molex™ (header #39-30-1060). Requires mating connector (receptacle/housing #39-01-2060), or

2) With integral 1 metre (nominal 39") leadwire cable, or

**Operating Ambient Temperature:**

0 to 65 degrees C (32 to 150 degrees F)

**Shipping and Storage Temperature:**

-40 to +65 degrees C (-40 to 150 degrees F)

**Atmosphere:**

Non-corrosive, non-explosive

**Minimum & Maximum fluid temperatures:**

1 to 95 degrees C (34 to 203 degrees F)

**Operating Pressure Differential:**

Maximum - 4 bar (60 psi)

**Pressure Rating: Static - 20 Bar (300 psi)**

Burst - 100 Bar (1500 psi)

**Valve Material:**

Body of bronze

Cartridge of Ryton™ (polyphenylene sulphide) and Noryl™ (polyphenylene oxide);

O-ring seals of EPDM rubber;

Stem of stainless steel.

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

**Flow Characteristics: Linear**

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

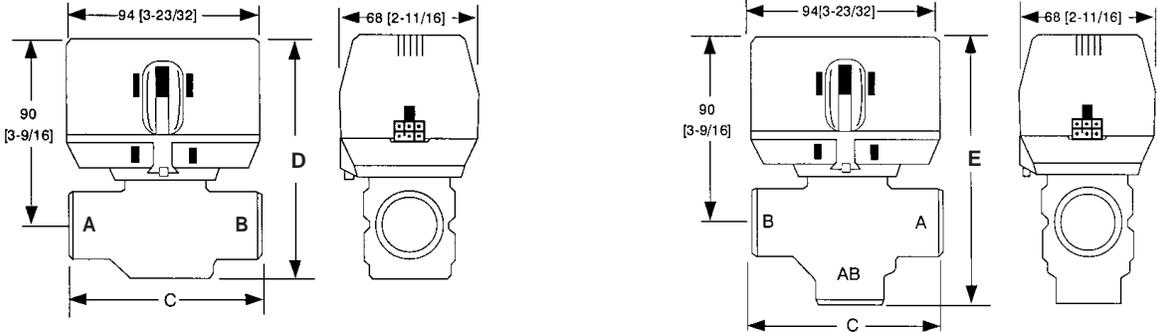
**Approvals:**

Underwriters Laboratories Inc. Listed  
 CSA Approved  
 CE Approved under EMC 89/336/EEC

**Accessories and Replacement Parts:**

40007029-002: Wrench for removing VC cartridge  
 VCZZ1100: 2-way characterized cartridge, unit pack  
 VCZZ6100: 3-way characterized cartridge, unit pack

**Fig. 1 - Nominal dimensions in inches and millimetres**



**Table 3. 2-Way Nominal Dimensions**

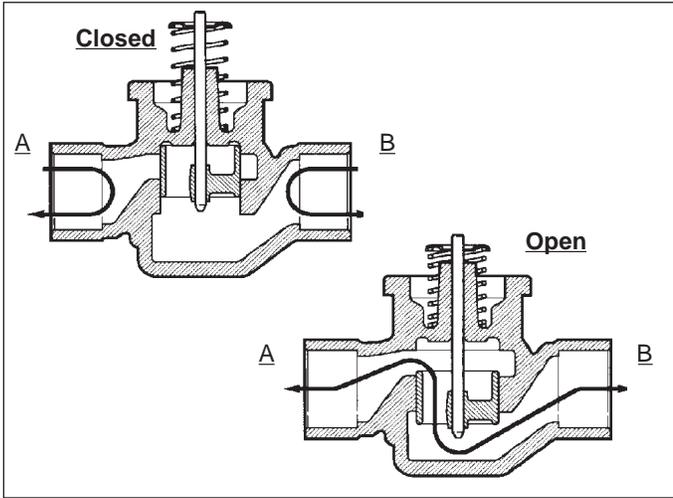
Pipe fitting sizes	Dimensions	C		D	
		mm	Inches	mm	Inches
3/8" FLARE (no adapter)		98	3 -7/8	111	4-3/8
1/2" SWEAT		98	3 -7/8	111	4-3/8
1/2" FLARE (no adapter)		98	3 -7/8	111	4-3/8
1/2" INVERTED FLARE (no adapter)		98	3 -7/8	111	4-3/8
1/2" BSPP(int.), 15 mm COMP.		98	3 -7/8	111	4-3/8
1/2" BSPP(int.)		98	3 -7/8	111	4-3/8
3/4" BSPP (int. & ext.), 3/4" BSPT (int.)		94	3-11/16	113	4-7/16
3/4" NPT (int.)		94	3-11/16	113	4-7/16
3/4" SWEAT		94	3-11/16	113	4-7/16
22mm* COMPRESSION		112	4-7/16	113	4-7/16
1" BSPP (int. & ext.), 1" NPT (int.)		94	3-11/16	113	4-7/16
1" SWEAT		94	3-11/16	113	4-7/16
28mm* COMPRESSION		116	4-9/16	113	4-7/16

**Table 4. 3-Way Nominal Dimensions**

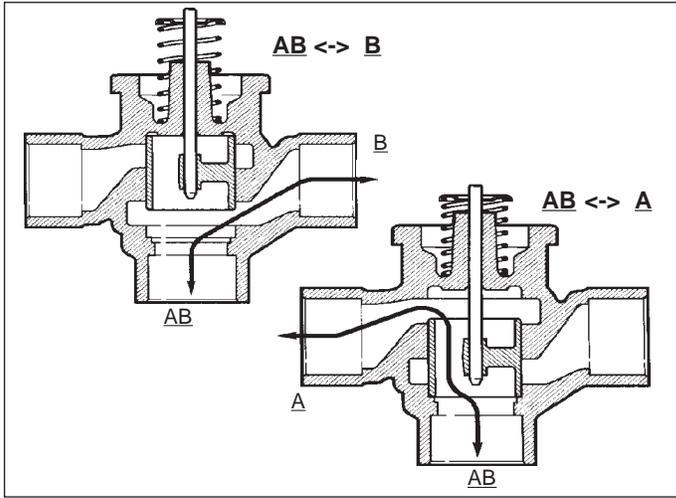
Pipe fitting sizes	Dimensions	C		E	
		mm	Inches	mm	Inches
3/8" FLARE (no adapter)		98	3 -7/8	136	5-11/32
1/2" SWEAT		98	3 -7/8	136	5-11/32
1/2" FLARE (no adapter)		98	3 -7/8	136	5-11/32
1/2" INVERTED FLARE (no adapter)		98	3 -7/8	136	5-11/32
1/2" BSPP(int.), 15 mm COMP.		98	3 -7/8	136	5-11/32
1/2" BSPP(int.)		98	3 -7/8	136	5-11/32
3/4" BSPP (int.), 3/4" BSPT (int.)		94	3-11/16	130	5-3/32
3/4" BSPP (ext.)		94	3-11/16	130	5-3/32
3/4" NPT (int.)		94	3-11/16	130	5-3/32
3/4" SWEAT		94	3-11/16	132	5-3/16
22mm* COMPRESSION		112	4-7/16	140	5-1/2
1" BSPP (int. & ext.), 1" NPT (int.)		94	3-11/16	136	5-11/32
1" SWEAT		94	3-11/16	136	5-11/32
28mm* COMPRESSION		116	4-9/16	147	5-13/16

\*includes compression nuts and olives

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



**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-person.
4. Always conduct a thorough check-out 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 25 mm head clearance is required to remove the actuator.



### 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 thermostat.

### PLUMBING

The valve may be plumbed in any angle 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.

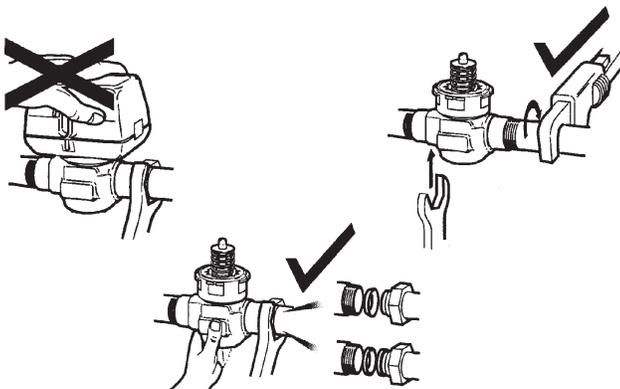
For use in diverting applications, the valve is installed with the flow water entering through bottom port AB, and diverting through end ports A or B. In mixing applications the valve is installed with inlet to A or B and outlet through AB.

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)

### 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 45Nm (33 ft.-lb.) for the 22 mm compression fitting, and 65Nm (48 ft.-lb) for the 28 mm compression fitting.

Fig. 4 - Plumbing of the VC Valve



### 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(part# 40007029-002) until it bottoms out. **DO NOT OVER TIGHTEN** (maximum torque is 4.5Nm [40 in-lb]). The top surface of the cartridge will be flush with the top edge of the body casting.
3. Replace valve actuator.

### TO INSTALL REPLACEMENT ACTUATOR

#### IMPORTANT

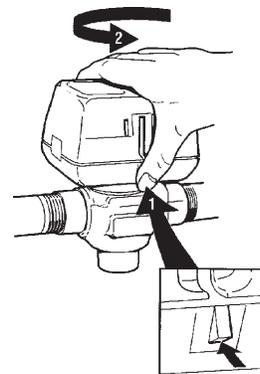
Installation of a new actuator does not require draining the system, provided the valve body and valve cartridge assembly remain in the pipeline.

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, or depress tab on Molex™ connector 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 figure 5 below). 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.

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

5. Install the new actuator by reversing the process in (4).
6. Reconnect leadwires or Molex™ connector.
7. Restore power, and check-out operation.

Fig. 5 - Latch Mechanism to detach Actuator



**MANUAL OPENER**

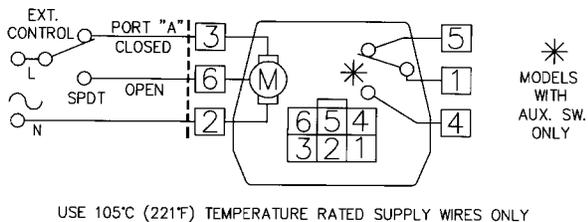
The manual opener can be manipulated only when in the up position. The "A" port can be manually opened by firmly pushing the white manual lever down to midway and in. In this position both the "A" and "B" ports are open, and with auxiliary switch models the switch is closed. This "manual open" position may be used for filling, venting and draining the system, or for opening the valve in case of power failure. The valve can be restored manually to the closed position by depressing the white manual lever lightly and then pulling the lever out. The valve and actuator will return to the automatic position when power is restored.

NOTE: If the valve is powered open, it cannot be manually closed, unless actuator is removed.

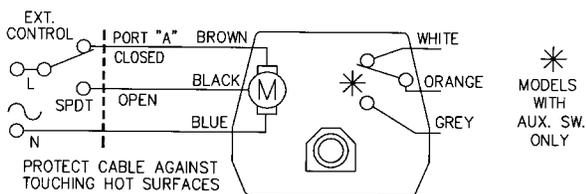
**WIRING**

One controller and a separate transformer is required to operate each valve. Figures 6a and 6b show wiring connections. Port "A" *open* and *closed* denote valve open and closed positions respectively. On auxiliary switch models, contact makes in between (NC) terminal 1 (orange wire) and (NO) terminal 4 (grey wire) in mid-range of opening cycle. On Molex™ connector models, valve & auxiliary switch voltage must be the same to meet approval requirement. When mixing line voltage and 24 Vac (Safety Extra Low Voltage) application together, the cable version must be used.

**Fig. 6a - Connector Pin Configuration for Molex™ Models for SPDT, floating Controller (Series 60).**



**Fig. 6b - Wiring Colour Code for Cable Models for SPDT, floating Controller (Series 60).**



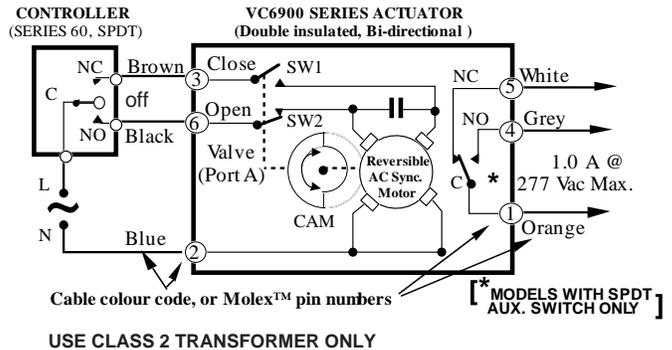
**OPERATIONS**

WITH SERIES 60 FLOATING CONTROLLER: (refer to figure 7)

The series 60 floating controller is an SPDT controller with a centre-off position. On a change in temperature from the set point,

the controller will close the NO or NC contacts, driving the valve to an intermediate position until a further change at the controller. The valve is set between the limits of the controller to satisfy various load requirements. In the event of a power failure, the valve will stay at whatever position it was in when the power was interrupted. When power is restored, the valve will respond to the controller demand.

**Fig. 7 - Wiring Schematic of the VC6900 Series Actuators**



**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 valve 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: Honeywell 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 also occur in high temperature (over 212°F [100°C]) systems with insufficient water pressure.

**IMPORTANT**

Do not use boiler additives 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 (anti-freeze solutions).

**CHECK-OUT**

1. Raise the set point of the thermostat above room temperature to initiate a call for heat.
2. Observe all control devices - The 2 way valve should open. Port A of the 3 way valve should open, port B should close. The auxiliary switch (if present) should operate and make at the end of the opening stroke, activating the auxiliary equipment.
3. Lower the set point of the thermostat below room temperature.
4. Observe the control devices. The 2 way valve should close. Port A of the 3 way valve should close. All auxiliary equipment should stop.

**Honeywell**

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### Floating Cartridge/Cage Valve

#### PRODUCT DATA



The VC7936 Fail Safe Modulating 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 VC7936 uses a microprocessor-controlled, low voltage stepper motor with a supercapacitor-based power supply that stores sufficient power to drive the valve to its fail safe position when 24V power is removed from the actuator. DIP switches are used to select actuator response time, flow characterization, motor timing, and control signal type.

A VC hydronic valve consists of a valve body and replaceable characterized cartridge assembly. When used with a Honeywell VC6900 or VC7900-series actuator, the valve provides proportional flow control. Three-way bodies may be used in either diverting or mixing applications. VC valves use cam-operated cartridge travel to resist water hammer. Limit switches prevent motor overrun. These actuators have engineered plastic housing and conformally coated printed circuit boards for humidity resistance. Multiple actuators may be operated by a single controller.

#### Specifications

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

##### Power:

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

##### Analog Control Signal:

0–10 or 2–10 Vdc, proportional signal into polarity-protected, 19 kilo-ohm input impedance.  
4–20 mA dc proportional signal with external 499 ohm 1% dropping resistor (not included).

##### Digital 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.)  
24 Vac, 1.5mA Pulse Width Modulated Signal (repeating voltage pulse up to 30 second period, with minimum 0.5 seconds on and off timing.)  
24 Vac, 1.5mA on-off control (contact closure over 30 seconds in duration, not suitable for use with power stealing thermostats or thermostats with anticipators)

**Annunciation:** red LED on cable end.

##### Nominal Control Timing:

60 or 120 seconds full stroke depending on DIP switch setting.

##### Electrical Termination:

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

##### Operating Ambient:

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

##### Shipping and Storage Temperature:

-40 to 150°F [-40 to +65 C]

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

##### Approvals:

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

**Fluid temperatures:** 34 to 203°F [1 to 95 C]

##### Pressure Rating:

Static - 300 psi [20 Bar] maximum.  
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 3 and DIP switch setting.

# VC7936

## MODELS:

Actuator: VC7936ZZ11, see Table 1

Bodies (order separately) : VCZ..., see table 3

Model Series	Voltage (50/60 Hz)	Action	Control Signal	Flow Characteristic	Nominal Stroke Timing
VC7936	24 Vac	Direct Acting	0-10 or 2-10 Vdc	Linear	120 seconds. Fail Safe Return: 12 seconds

Table 1. VC7936 Actuator factory settings

## VC Valve assembled dimensions for reference (Fig. 1 & Table 2)

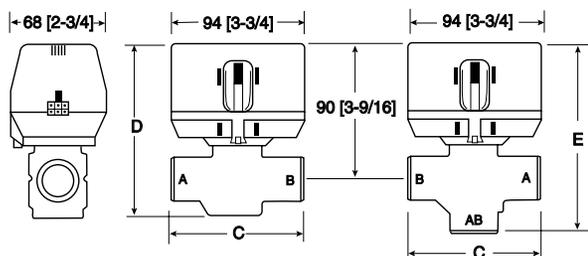


Figure 1: Nominal dimensions in inches [millimetres].

[4] Pipe Fitting Sizes	Dimension 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.)						
3/4" BSPT (int.)	94	3-11/16			130	5-1/8
3/4" BSPP (ext.)			113	4-7/16		
22mm Compression [3]					140	5-1/2
1" BSPP (int.)	94	3-11/16			136	5-11/32
1" BSPP (ext.)	95	3-11/17	114	4-7/17	137	5-11/33
1" BSPT (int.)	94	3-11/16			136	5-11/32
28mm Compression [3]	116	4-9/16	113	4-7/16	147	5-13/16
<b>NORTH AMERICA STANDARD MODELS</b>						
3/8" FLARE [1]	98	3-7/8			136	5-11/32
1/2" SWEAT	89	3-1/2			130	5-1/8
1/2" FLARE [1]			111	4-3/8		
1/2" INVERTED FLARE [1]	98	3-7/8			136	5-11/32
1/2" NPT (int.)						
3/4" NPT (int.)					130	5-1/8
3/4" SWEAT					132	5-3/16
1" NPT (int.)	94	3-11/16	113	4-7/16		
1" SWEAT					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 valve assembled dimensions

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

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				
VCZAM	3/4" SWEAT	4.6	3.9			
VCZAR	1" NPT (int.)	6.6				
VCZAS	1" SWEAT	6.2	4.2	0.8	1.5	
VCZBE	1-1/4" SWEAT					
VCZBD	1-1/4" NPT (int.)	7.0				

3-way Valve	[5] Cartridge	6000	6100	6400	6500	6600
		Nominal KVS Rating [8]				
Number	Pipe Fitting Sizes					
VCZME	1/2" BSPP (int.) [2]	3.4	3.2			
VCZMN	1/2" BSPT (int.)		3.3			
VCZMH	3/4" BSPP (int.)		5.9			
VCZMJ	3/4" BSPT (int.)	7.0	5.3			
VCZMG	3/4" BSPP (ext.)	6.9	5.7			
VCZMF	22 mm Compression [3]	7.1	5.9			
VCZMP	1" BSPP (int.)		6.4			
VCZMQ	1" BSPP (ext.)		6.8			
VCZMT	1" BSPT (int.)		6.9			
VCZMM	28 mm 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					
VCZND	1-1/4" NPT (int.)	8.6				

FLOW CHARACTERISTIC	Quick Open	Linear	Equal Percentage
		[7]	
APPLICATION	[6]	On-Off	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.

Table 3: VC Series Valve Bodies

## INSTALLATION

### WHEN INSTALLING THIS PRODUCT:

1. Read these instructions carefully. Failure to follow them could damage the product.
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 check-out 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 (or finer) system side stream filter(s)*.

The manual lever is used both as a position indicator and as a manual opener to allow initial system flushing.

Alternatively, reusable flush caps, part # 272866B, may be purchased separately for use in initial flushing of dirty hydronic systems.



### IMPORTANT:

Do not use boiler additives 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 horizontal level of the body. Make sure there is enough room around the actuator for servicing or replacement. Refer to installation & 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 pipes. 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 degrees) to line up the actuator with the piping. The latch will click when engaged. See Figure 5.

- Note: The actuator can also be installed at right angles to the valve body but in this position the latch mechanism will not engage.
2. Connect lead wires. See figure 6 for flexible conduit installation with plenum-cable models.

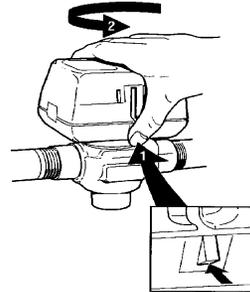


Fig. 5 - Latch Mechanism to detach Actuator

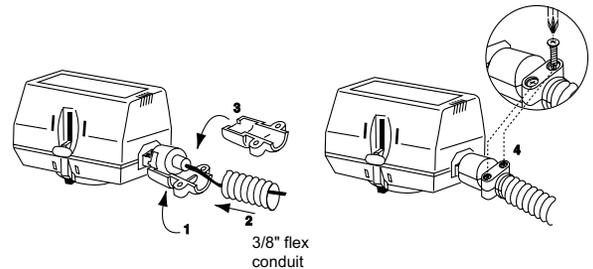


Fig. 6 - Flexible Conduit Attachment

## WIRING



### 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. The blue lead must connect to the controller's common terminal when using analog inputs. However, digital 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.

**OPTION SWITCH SETTINGS**

The VC 7936 has four DIP switches for setting operating characteristics. These are accessible through the slots in the upper part of the case on the end of the actuator with the wiring connections, and may be operated with the tip of a mechanical pencil, or a straightened paper clip. A DIP switch is ON when the switch lever has been moved UP, away from the valve body. They number 1 to 4 from left to right. See table 4.

DIP SWITCH	1	2	3	4
ON ↑	REV	0-10V	EQUAL %	60 S
OFF ↓	DIR	FLOATING	LINEAR	120 S

**Table 4: Dip switch on/off selection for operating characteristics**

**Sw.1** sets the actuator response.

OFF = direct (normal) operation: A port open with 10 Vdc input (factory setting).  
 ON = reverse operation, A port closed with 10 Vdc input. This is useful, for example, for correcting plumbing errors with 3-way valves. This setting affects all control modes.

**Sw.2** sets control signal type.

OFF = floating, PWM, or on-off (digital) inputs.  
 ON = analog voltage modulating input (factory setting). The VC7936 accepts a variety of control inputs.

**Sw.3** sets valve flow characterization.

OFF = linear response, where the stem position is a linear function of the input voltage, and flow is solely a function of the valve body (factory setting).  
 ON = equal percentage, where the stem position is a 50% equal percent function of input voltage. Equal percentage response improves comfort control during mild weather in heating systems with constant, high temperature supply water, or in chilled water systems in arid desert climates. Please refer to the Honeywell Engineering Manual of Automatic Control, publication #77-1100, for a detailed explanation.

**Sw.4** sets actuator timing.

OFF = 2 minute end-to-end valve travel (factory setting).  
 ON = 1 minute travel. The faster response may be needed in lower mass systems.

**OPERATION**

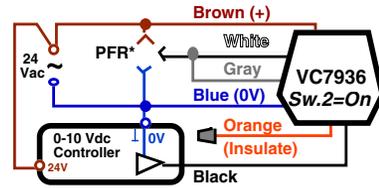
**WITH SERIES 70 MODULATING CONTROLLER**

Refer to figure 7, DIP switch #2 must be ON (factory default)

The controller output may be either 0 to 10 Vdc or 2 to 10 Vdc, but the VC7936 will be closed at 2 V to minimize false control signals caused by induced electrical noise on the wiring.

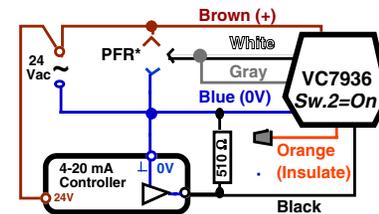
In direct acting mode (DIP switch #1 off), the valve will be fully closed with a 2 V or lower signal, and fully open with a 10 V signal. In reverse acting mode, 10 V is closed and 2 V is open.

For a 4-20 mA control signal, wire a 499 ohm, 1/2 W resistor between the black and brown actuator input leads to develop a 2-10Vdc signal. If the controller is nearby, the resistor may be installed on the controller's terminal block. See figure 8.



*Valve PFR Position	Connect Wires
Close "port A"	White + Gray + Brown
Open "port A"	White + Gray + Blue

**Fig. 7 - Wiring Color Code for Cable Models for Modulating (0-10V or 2-10V) Controller**



*Valve PFR Position	Connect Wires
Close "port A"	White + Gray + Brown
Open "port A"	White + Gray + Blue

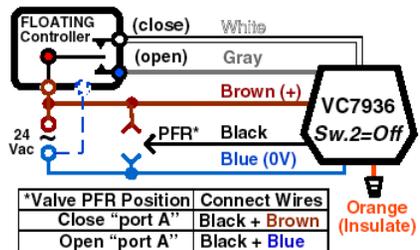
**Fig. 8 - Wiring Color Code for Cable Models for Modulating (4-20mA) Controller**

**WITH SERIES 60 FLOATING (TRISTATE) CONTROLLER**

Refer to figure 9, DIP switch #2 must be OFF, switch #1 = OFF.

A Series 60 floating controller has SPDT contact closure outputs with a center-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 VC7936. The pulse can be held as long as necessary.

For control stability, the stroke time of the actuator while powered has been simulated at either 120 or 60 seconds, depending on DIP switch #4. In fail safe and testing operation, the actuator travels through its stroke in 12 seconds.



*Valve PFR Position	Connect Wires
Close "port A"	Black + Brown
Open "port A"	Black + Blue

**Fig. 9 - Wiring Color Code for Cable Models for Floating (Series 60 or "tristate) Controller**

## VC7936 - WIRING, OPERATION, SERVICE, CHECK-OUT

### WITH SERIES 70 PWM CONTROLLER

Refer to figure 10, DIP switch #2 must be OFF

A Pulse Width Modulating controller has a SPST contact closure output that supplies a repetitive voltage pulse. The duty cycle of the pulse (percentage on time) is proportional to the position of the valve. This control signal was originally developed for use with electromechanical thermal actuators.

If the VC7936 sees the a voltage pulse simultaneously on the gray and white input leads, it automatically interprets this as a PWM signal, and changes the valve to the new position on the second pulse.

PWM pulses must be at least 1/2 second long in order to be detected by the VC7936. A 1/2 second pulse is interpreted as an Off signal. The pulse period may be up to 30 seconds, and pulses must be separated by an off period no shorter than 1/2 second. The VC7936 will automatically synchronize to the period of the pulse train.

If DIP switch #1 is on, valve position is proportional to the off time percentage of the pulse train.

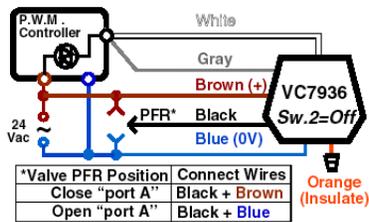


Fig. 10 - Wiring Color Code for Cable Models for Pulse Width Modulating (PWM) Controller

### WITH SERIES 80 ON-OFF CONTROLLER

Refer to figure 11, DIP switch #2 must be OFF

A Series 80 controller has a SPST contact closure output that supplies 24V power to the controlled device. VC7936 wiring is identical to the PWM installation, above. If a "PWM" pulse extends longer than 30 seconds, the VC7936 interprets this as an on-off control signal, and opens the valve at its 12 second speed. Note that the valve response is delayed by 42 seconds from application of the controller signal. If DIP switch #1 is on, the valve closes when the signal is received.

NOTE: the current draw of the control inputs of the VC7936 is not high enough to operate either a power stealing electronic thermostat, or the anticipator of an electromechanical low voltage thermostat.

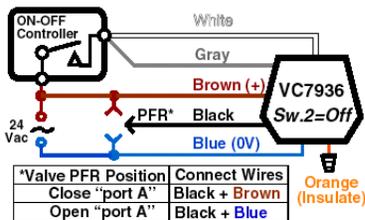


Fig. 11 - Wiring Color Code for Cable Models for ON-Off (Series 80) Controller

### 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 VC7936 wired for PFR-

Open will open the A port fully. A VC7936 wired for PFR-Close will open the A port fully. The motor can drive the valve through its full stroke in 12 seconds.

PFR position is chosen during installation. In analog mode (DIP switch #2 ON), the white and gray wires are connected to signal common (blue) to fail safe open, or to 24 V (brown) to fail safe closed. In digital mode (DIP switch #2 OFF), 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 24 V power to the appropriate PFR direction selection lead(s) while power is present. Applying 24 V 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 may be 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. 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 self-calibration compensates for motor tolerance and lets one controller operate multiple VC7936. 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.*

### CHECK-OUT

1. Raise the set point of the thermostat above room temperature to initiate a call for heat.
2. Observe all control devices - 2 way valve should open. Port A in 3-way valve should open, and port B should close in 90 seconds.
3. Lower the set point of the thermostat below room temperature.
4. Observe the control devices. 2 way valve should close. Port A in 3-way valve should close, and port B should open in 90 seconds.
5. Remove power from actuator. Actuator waits 3 seconds then drives valve to default position, i.e.: open (or closed), in 12 seconds or less.
6. Restore power to actuator. Valve should drive to the position required by the thermostat or controller in 90 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 valve 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:** Honeywell 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 also 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 figure 5 below). 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.