

XE70 SERIES

VC SERIES BALANCED HYDRONIC VALVES 2-WAY AND 3-WAY

PRODUCT SPECIFICATION SHEET





Honeywell VC Series balanced hydronic valves allow greater control of hot and/or cold water flow. The VC Series is designed for both domestic boiler heating, and domestic cooling applications.

FEATURES

- 2-way or 3-way
- Control by a low or line voltage SPST or SPDT controller
- Minimal actuator power consumption
- Option of valve timings to suit the application
- 0 - 95°C fluid temperature
- Pressure differential up to 4 bar
- Double insulated actuator
- Quick connect electrical connections
- 0 - 65°C ambient temperature
- Safe use with potable water
- Quick and easy replacement of moving parts
- Actuator head installation does not require draining of the system

OPERATING FEATURES

VC Series 2-position hydronic valves are used in domestic and small commercial applications to control the flow of hot and/or cold water. They consist of an actuator, valve and a cartridge assembly.

2-way valves are designed for on-off 'zone' control of domestic systems. 3-way valves can be piped for either diverting or mixing valve applications in domestic central heating and/or cooling systems. Both versions can be used to control individual fan coil, baseboard radiator or convector applications. Depending on the model selected they can be controlled by a low or line voltage SPST  or SPDT 

controller, such as a room thermostat, aquastat or flow switch.

VC Series hydronic valves are designed to take advantage of sinusoidal valve actuator travel, and therefore operate silently and without water hammer. Through internal logic the actuator only takes power while driving the valve to the commanded position. Two valve timings are available: the fast response time is preferable for combi-boilers, the slower response time is applicable for critical applications.

The actuator head is removable without affecting the integrity of the water system. All actuator versions are

interchangeable with any valve body, offering the highest flexibility for boiler production line assembly, and maintenance. The valve piston construction allows for port sealing that is independent of the differential pressure across the valve. Flow through the 2-way valve can be in either direction, so the ports are not designated. 3-way valves are suitable for both diverting water from AB to A or B, and from A or B to AB.

SERIES OVERVIEW

Actuator	Control input	Electrical connections	Options	Body	Pipe connections
24 Vac 100-130 Vac 200-240 Vac	SPST SPDT	Molex™ quick connector 1 metre cable	Auxiliary switch (SPDT) port A	2-way 3-way	BSPP external BSPP internal BSPT NPT Sweat Compression Flare (inverted and standard)

CONSTRUCTION AND OPERATION

All moving and sealing parts of the valve are constructed in the cartridge assembly. The ports are sealed with O-rings on the outer surface of the piston.

When the valve stem is driven down to open port A the water will flow through the hollow piston to the other port. In case of a 3-way valve with the piston driven down port B is sealed, allowing flow between port AB and port A. With the stem up the flow is between port AB and port B.

The valve family offers a variety of versions of pipe connections to suit the different applications. The valve pressure loss characteristic is dependent on the pipe connections/ dimensions. For the actual valve rating please refer to the specification section.

2-way valve With an SPDT (3-wire) actuator

On a call for heat, the NO controller contacts close and the valve opens. When the valve is fully open, the cam closes switch SW1 and opens switch SW2. When the need for heat is satisfied the NC controller contacts close, energising the valve through SW1 and closing the valve. When the valve is fully closed, the cam closes SW2 and opens SW1. The valve is ready for the next call for heat.

With an SPST (2-wire and common) actuator

On a call for heat, the controller contacts close, RLY1 is energized making the NO contacts in switch SW3 causing the valve to open. When the valve reaches the fully open position the cam closes switch SW1 and opens switch SW2. When the need for heat is satisfied, the controller contacts open, RLY1 is de-energized and the valve motor is driven through SW1 and the NC contacts of SW3. When the

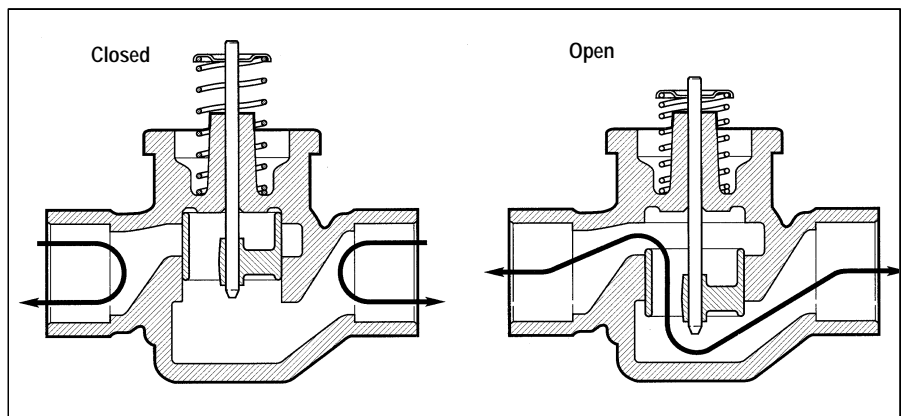


Figure 1 Fluid flow through 2-way

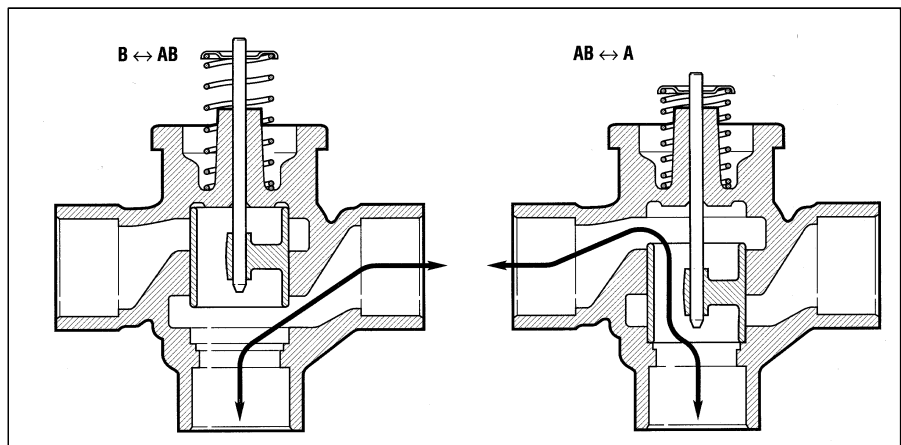


Figure 2 Fluid flow through 3-way

CONSTRUCTION AND OPERATION

valve reaches the fully closed position, the cam closes SW2 and opens SW1. The valve is ready for the next call for heat.

For both types of actuator a power failure will leave the valve at the position it was when interrupted. When power is restored, the valve will respond to controller demand.

3-way diverter valve With an SPDT (3-wire) actuator

On a call for heat, the NO controller contacts close, the valve closes port B and opens port A. When port A is in the fully open position the cam closes limit switch SW1 and opens limit switch SW2. When the need for heat is satisfied the NC controller contacts close, energising the valve through SW1, causing port A to close. When port A is fully closed the cam closes SW2 and opens SW1. The valve is ready for the next call for heat.

With an SPST (2-wire and common) actuator

On a call for heat the controller contacts close, RLY1 is energized making the NO contacts in switch SW3, causing port B to close and port A to open. When port A reaches the fully open position the cam closes switch SW1 and opens switch SW2. When the need for heat is satisfied, the controller contacts open. RLY1 is de-energized making the NC contacts in SW3 and port A is driven closed through SW1 and the NC contacts of SW3. When port A is in the fully closed position the cam closes SW2 and opens SW1. The valve is ready for the next call for heat.

For both types of actuator a power failure will leave the valve at the position it was in when interrupted. When power is restored, the valve will respond to controller demand.

Wiring

Figures 3 and 4 show wiring connections for 2-way and 3-way valves. Port A open and closed denotes valve open and closed for 2-way, and AB-A open and AB-B open for 3-way valves respectively. A means for disconnection from the supply having a contact separation of at least 3 mm in all poles must be incorporated in the fixed wiring. On Molex™ connector models, actuator and auxiliary switch voltages must be the same to meet the approval requirement. For mixed voltages, the cable assembly version is recommended.

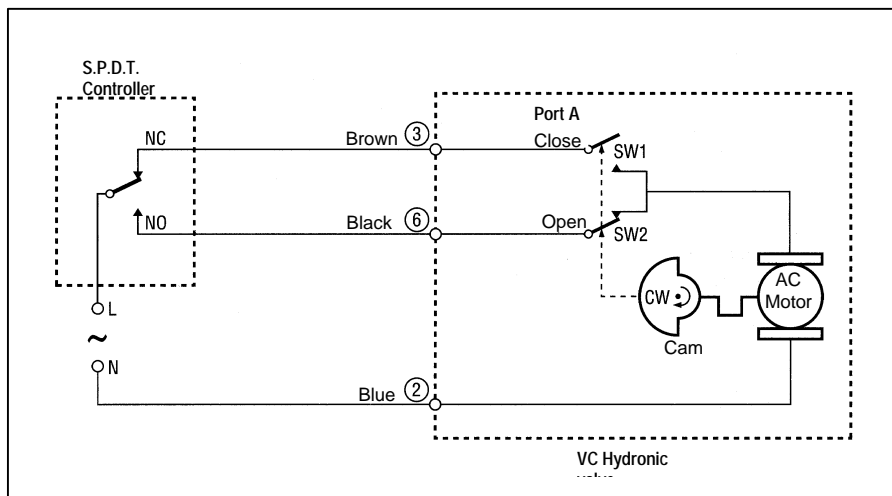


Figure 3 Logic sequence diagram with 3-wire actuator for SPDT controller

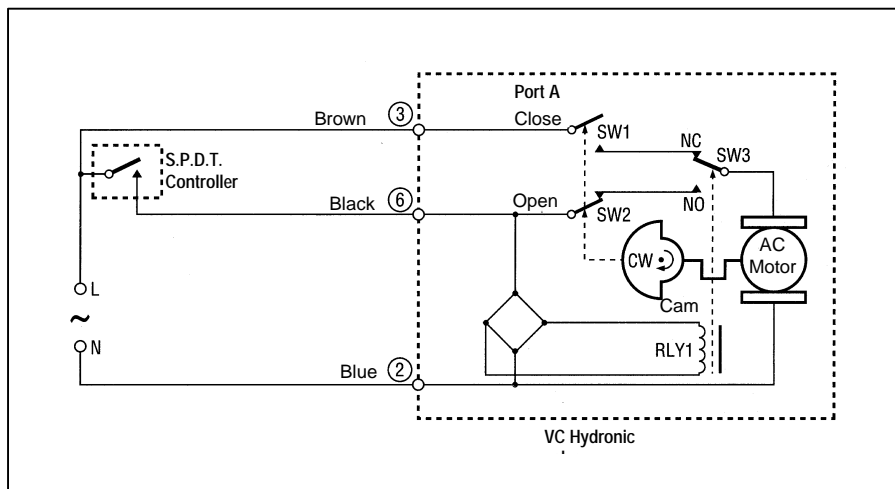


Figure 4 Logic sequence diagram with 2-wire + common actuator for SPST controller

SPECIFICATIONS

Voltage	Colour-coded label
24 V 50-60 Hz	Blue
100-130 V 50-60 Hz	Black
200-240 V 50-60 Hz	Red

Power consumption
4 VA (when valve position changes)

Auxiliary switch rating
2,2 (1,0) A @ 250 V, 50-60 Hz
(minimum 0,05 A @ 24 Vdc)

Nominal timing
Available in 2 versions:
1. Valve opens in 7 seconds
2. Valve opens in 24 seconds
(20% faster for 60 Hz)

Electrical termination
1. Molex™ : requires mating connector
- ordering number 39-01-2060
Contacts: Mini-Fit 5556 Series
2. With integral 1 m leadwire cable

Maximum ambient temperature
65°C

Min. and max. fluid temperatures
0-95°C (short duration peak: 120°C)

Pressure rating
Static - 20 bar
Burst - 100 bar

Max. operating pressure differential
4 bar

Flow rating
Dependent upon body configuration
See figures 6 and 7

Flow
2-way: flow can be in either direction.
When the actuator is not mounted the valve is in the closed position.
3-way: bottom port is marked AB. The end ports are marked A and B. When the actuator is not mounted port A is closed.

Valve material
Body Bronze
Cartridge Ryton™
(polyphenylene sulphide)
Noryl™
(polyphenylene oxide)
O-ring seals EPDM rubber
Stem Stainless steel
Actuator cover Noryl™ (94V-0)
Actuator base Ryton™ (94V-0)

Dimensions
See figure 7

Pipe fitting sizes

	3/8"	1/2"	3/4"	1"	15 mm	22 mm	28 mm
Flare	E	E	-	-	-	-	-
Inverted Flare	-	I	-	-	-	-	-
Sweat	-	E	E	E	-	-	-
BSPP	-	I	E I	E I	-	-	-
BSPT	-	-	I	-	-	-	-
NPT	-	-	I	I	-	-	-
Compression fitting	-	-	-	-	E	E	E

I Internally threaded
E Externally threaded

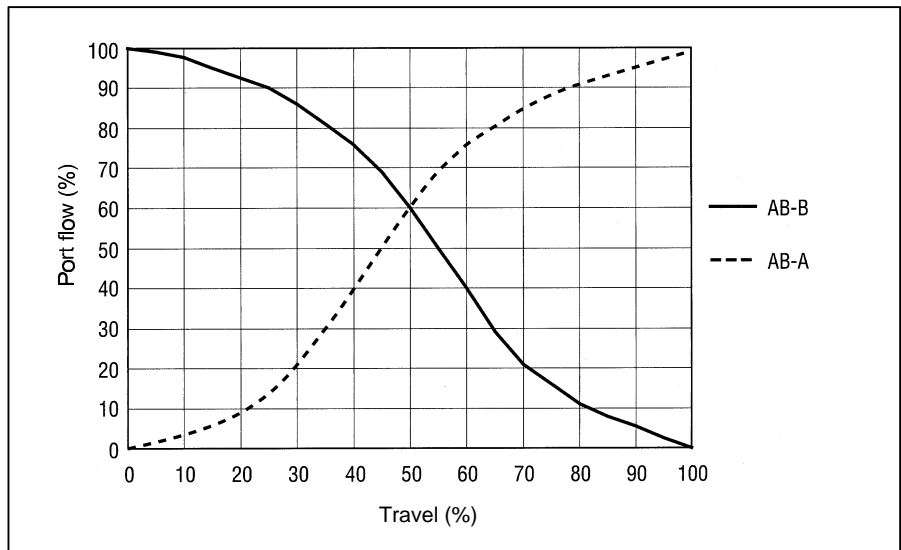


Figure 5 3-way valve diverting flow characteristic at constant pressure on port AB

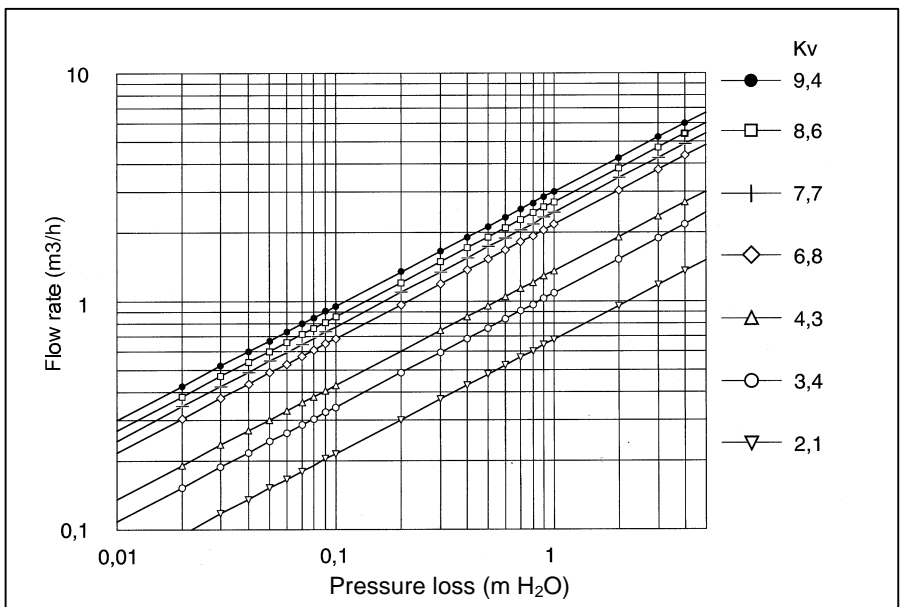


Figure 6 Valve pressure loss characteristic

SPECIFICATIONS

Pipe fitting	2-way valve		3-way valve		
	C	Nominal flow rating Kv	C	D	Nominal flow rating Kv
15 mm compression	98	3,4	98	136	4,3
22 mm* compression	112	6,8	112	140	8,6
28 mm* compression	112	7,7	112	140	8,6
3/4" BSPT(internal)	94	6,8	94	130	8,6
3/4" NPT	94	6,8	94	130	7,7
1/2" BSPP (external)	98	3,4	98	136	4,3
3/4" BSPP	94	6,8	94	130	7,7
1" BSPP	94	7,7	94	136	8,6
1/2" sweat	98	3,4	98	136	4,3
3/4" sweat	94	6,8	94	132	8,6
1 "sweat	94	8,6	94	136	8,6
3/8" flare	98	2,1	98	136	2,6
1/2" flare	98	3,4	98	136	3,4
1/2" inverted flare	98	3,4	98	136	4,3

All dimensions in mm
 * Includes compression nuts and olives

Figure 7 Valve dimensions

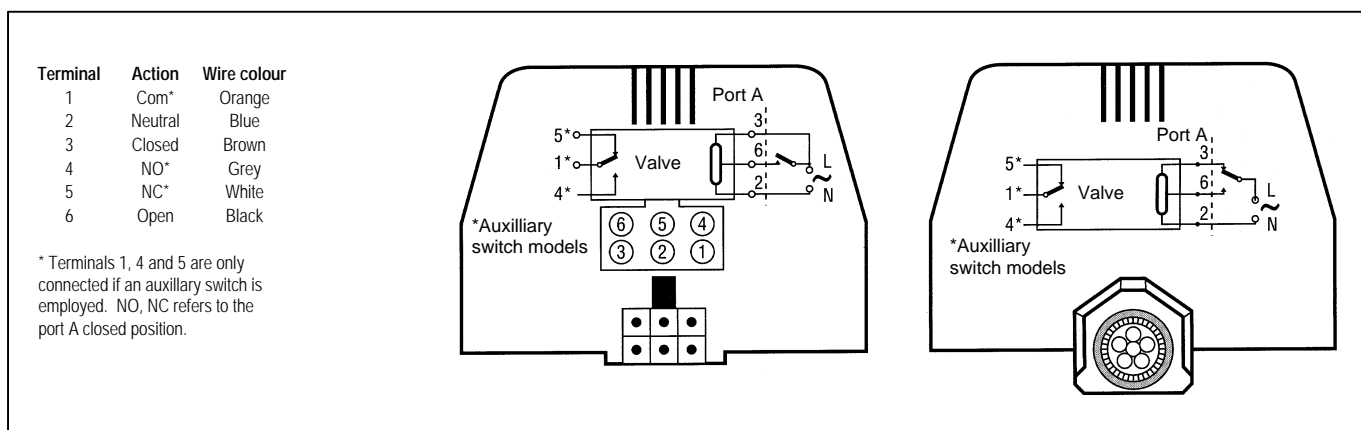


Figure 8 Wire terminal colour coding

INSTALLATION DATA

WARNING

Installer must be a trained, experienced service person.

When installing this product:

- ❑ Read these instructions carefully. Failure to follow them could damage the product or cause a hazardous condition.
- ❑ Check the ratings given in the instructions and on the product to make sure it is suitable for your application.
- ❑ Always conduct a thorough checkout after installation.

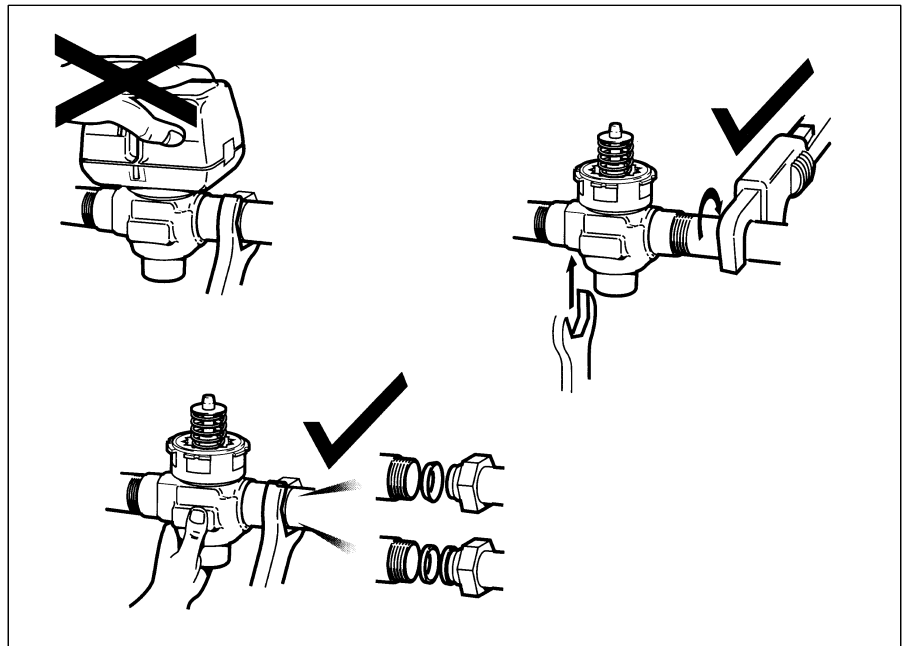


Figure 9 Plumbing

CAUTION

- ❑ Disconnect power supply before wire connection to prevent electrical shock and equipment damage.
- ❑ It is advisable to remove the actuator head from the valve body for ease of installation. Fit the actuator head in the most convenient position for wiring.
- ❑ On sweat fitted valves, the cartridge is shipped loose or is removed to avoid being damaged during the solder operation.
- ❑ On 24 V systems, never short circuit the valve coil terminals. This may burn out the heat anticipator in the thermostat.
- ❑ To remove the actuator head 25 mm clearance is needed above the actuator.

Plumbing

The valve may be plumbed in any angle but preferably not with the actuator head below the horizontal level of the valve body. Make sure there is enough room around the actuator head for servicing or replacement.

When used to form part of a central heating system, do not locate it where it will block the system vent, cold feed or any bypass when the valve is closed.

Mount the valve directly in the tube or pipe. Do not grip actuator head while making and tightening plumbing connections. Either hold valve body in your hand or attach adjustable spanner across the hexagonal or flat faces on the valve body.

Compression models

For compression fitted models, tighten the compression nuts enough to make a watertight seal. Take care not to overtighten.

To install a replacement actuator head

Important

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

1. Disconnect power supply before servicing to avoid electrical shock or equipment damage.
 2. Disconnect leadwires to actuator head, or depress tab on Molex™ connector and remove. Where appropriate, label wires for rewiring.
 3. The actuator head is automatically latched to the valve (see figure 10). To remove, lift up on the latch mechanism located directly below the red manual open lever. Press the actuator head down towards the body with moderate hand force and turn counter-clockwise by 1/8 turn (45 degrees) simultaneously. Lift the actuator head 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 is not engaged.
4. Install the new actuator head by reversing the process in (3).
 5. Reconnect leadwires or Molex™ connector.
 6. Restore power.

INSTALLATION DATA

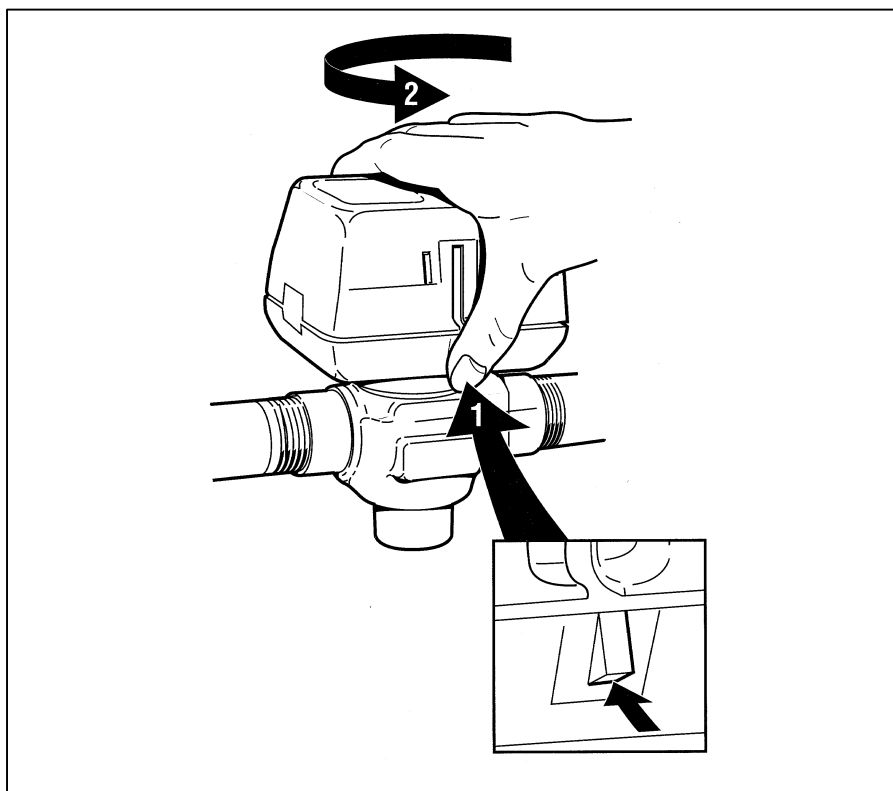


Figure 10 Latch mechanism

ADJUSTMENT AND TESTING DATA

Manual opener

The manual opener can be manipulated when in the up position. The motorized valve can be opened by firmly pushing the red manual lever down to midway and in (only possible if the actuator is in the upper position). This holds all ports in the open position, and with auxiliary switch models the NO switch is closed. Ports A and B of 3-way valves are opened. This 'manual open' position may be used for filling, venting or 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 red manual lever lightly and then pulling it out. The valve actuator returns to the automatic position when power is restored.

Checkout

1. Raise the set point of the thermostat above room temperature to initiate a call for heat. Valve position indicator should move downward to the open position.
2. For all auxiliary switch models, monitor the control devices.
2-way valve: check that the valve opens, the auxiliary switch (if present) closes, and at the end of the opening stroke the circuit to the circulator or another valve is made.
3-way valve: check that port A opens, port B closes, the auxiliary switch (if present) operates, and at the end of the opening stroke the circuit to the circulator or another valve is made.
3. Lower the set point of the thermostat below room temperature.
4. Observe the control devices.
2-way valve: check that the valve closes and all auxiliary equipment stops.
3-way valve: check that port A closes and all auxiliary equipment stops.

SERVICE DATA

WARNING

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

1. If the valve is leaking, drain system or isolate valve from the system.
2. Check to see if the cartridge needs to be replaced.
3. If the gear train or the motor is damaged, replace the 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 occur in high temperature (over 100°C) systems with insufficient water pressure.

ORDERING SPECIFICATION

2-port valves

Model	Wiring Connections	Pipe Connections	KV	Type	Differential Pressure for Close-off
VC4013AF1000	2 wire + common	½" BSPP/15 mm	3.4	Straight through	4 bar
VC4013AJ1000	2 wire + common	¾" BSPP	6.9	Straight through	4 bar
VC4013AP1000	2 wire + common	1" BSPP	7.7	Straight through	4 bar
VC6013AF1000	3 wire	½" BSPP/15 mm	3.4	Straight through	4 bar
VC6013AJ1000	3 wire	¾" BSPP	6.9	Straight through	4 bar
VC6013AP1000	3 wire	1" BSPP	7.7	Straight through	4 bar

3-port valves

Model	Wiring Connections	Pipe Connections	KV	Type	Differential Pressure for Close-off
VC4013ME1000	2 wire + common	½" BSPP/15 mm	4.3	Diverting	4 bar
VC4013MH1000	2 wire + common	¾" BSPP	7.7	Diverting	4 bar
VC4013MP1000	2 wire + common	1" BSPP	8.6	Diverting	4 bar
VC6013ME1000	3 wire	½" BSPP/15 mm	4.3	Diverting	4 bar
VC6013MH1000	3 wire	¾" BSPP	7.7	Diverting	4 bar
VC6013MP1000	3 wire	1" BSPP	8.6	Diverting	4 bar

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Helping You Control Your World