# KVC6934, KVC6936

## Floating Actuators without and with Power Failure Reposition for KVC Series Cartridge Valve

The KVC6934 Floating Control actuator and KVC6936 Fail Safe Floating Control actuator are used with KVC series hydronic valves to provide proportional control of hot or chilled water in commercial heating and cooling applications, such as unit ventilators. These KVC actuators use cam-operated cartridge travel to resist water hammer. Internal limit switches prevent motor overrun. They have conformal coated printed circuit boards for humidity resistance.

The 24 Vac, 3-wire signal compatible, **KVC6934** series actuator is used with either a single pole double throw two-position controller for on-off control, or a tri-state (SP3T or 2xSPST) floating controller for modulating control. The KVC6934 does not have the fail safe reposition feature.

The **KVC6936 Fail Safe** Floating Control Actuator 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. KVC6936 valve actuators are used with any thermostat or controller with a tri-state (SP3T or 2 x SPST) output. On a power failure, this patented actuator design drives the valve to the position of full flow through the coil to reduce the risk of freeze up.

The KVC hydronic valve consists of a valve body and replaceable characterized cartridge assembly. When used with a KVC6934 or KVC6936 series actuator, the valve provides proportional flow control. Depending on models selected, they provide linear or equal percentage flow in straight through application; or linear flow in three-way mixing or diverting applications.

## Specifications

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

**KVC6934, KVC6936:**

**Supply Voltage**: 24 V, 50-60 Hz. Class 2 circuit

**KVC6934:**

**Power Consumption:** 4 watts nominal (during valve position change). Use 24V Class 2 transformer and provide 6 VA for connection wiring sizing for each valve.

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

**Nominal Timing:** Full flow in 2 minutes (at 60 Hz). 140 seconds actual full stroke (at 60 Hz).

**KVC6936:**

**Power consumption:** 18VA maximim (during start up).12 watts.

**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.

**Nominal Timing:** Full flow in 2 minutes (at 60 Hz). 140 seconds actual full stroke (at 60 Hz).

**KVC6934, KVC6936:**

**Maximum Duty Cycle:** 15%.

**Electrical Termination:**
5 feet [1.5 m] plenum-rated cable per UL94-5V. Flexible conduit clamp included.

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

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

**Shipping and Storage Temperature:**
-40 to 150°F [-40 to +65°C]

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

**Approvals:** UL (plenum rating), CE
FCC Part 15 Class B

**MODELS**:

**Actuator (tri-state):** KVC6934, KVC6936 (No end switches)

| Model Number | Voltage (50/60 Hz) | Power Failure Return | Nominal Stroke Timing | Electrical Connection |
|---|---|---|---|---|
| KVC6934 | 24 Vac | No | 2 minutes | 5' [1.5m] plenum-rated cable |
| KVC6936 | | Yes | 2 minutes *Power Failure: 12 seconds* | |

**MODELS**:

**BODIES (Order Separately):** KVC..., per table: 1

| 2-way Valve Number | Cv Rating | Flow Type | Body Fitting | 3-way Valve Number | Cv Rating |
|---|---|---|---|---|---|
| KVC2050N32 | 3.2 | Linear | 1/2" NPT | KVC3050N37 | 3.7 |
| KVC2050N29 | 2.9 | Equal Percentage | | | |
| KVC2050N07 | 0.7 | | | | |
| KVC2050N13 | 1.3 | | | | |
| KVC2075N47 | 4.7 | Linear | 3/4" NPT | KVC3075N66 | 6.6 |
| KVC2100N66 | 6.6 | | 1" NPT | KVC3100N87 | 8.7 |
| KVC2125N71 | 7.1 | | 1-1/4" NPT | KVC3125N92 | 9.2 |

For example, to order a 2- way, 3/4" FNPT valve with linear control characteristic for chilled water, order **KVC2075N47**.

**Table 1: KVC valve body assemblies**

**KVC Valve Assembled dimensions for reference (Fig. 1 & Table 2):**

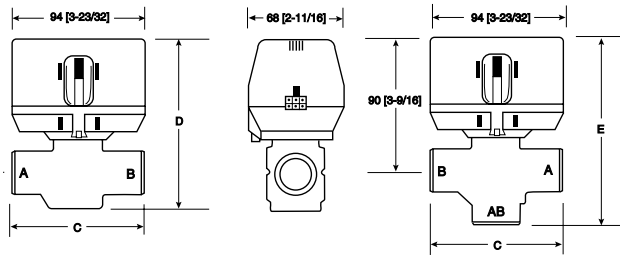



**Figure 1: Nominal dimensions in inches and millimetres**

| Dimension / Pipe Fitting Sizes | C | | D (2-way) | | E (3-way) | |
|---|---|---|---|---|---|---|
| | inches | mm | inches | mm | inches | mm |
| 1/2" NPT | 3-7/8 | 98 | 4-3/8 | 111 | 5-11/32 | 136 |
| 3/4" NPT | 3-11/16 | 94 | 4-7/16 | 113 | 5-3/32 | 130 |
| 1" NPT | 3-11/18 | 94 | 4-7/18 | 113 | 5-11/32 | 136 |
| 1-1/4" NPT | 4-5/16 | 110 | 4-5/8 | 118 | 5-5/8 | 142 |

**Table 2: KVC Valve assembled dimensions**

**MANUAL OPENER**

The manual opener can be manipulated only when in the up position. The motorized valve can be opened by firmly pushing the red manual lever down to midway and in. This holds the valve in the open position. This "manual open" position may be used for filling, venting, 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 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 can not be manually closed unless actuator is removed.

## 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 position to suit the most convenient wiring mode.
6. An extra 1" (25 mm) head clearance is required to remove

**CAUTION:**

Disconnect power supply before connecting wiring to prevent electrical shock and equipment damage.

On 24 V systems, **never** jumper the valve coil terminals, even temporarily. This may damage the thermostat.

**PLUMBING**

Refer to the KVC Series Cartridge Valve Installation and Instruction Sheet for detail plumbing instructions.

**IMPORTANT:**

**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).**

**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).**

Put the KVC actuator manual lever in the manual open or preferably 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.

**TO INSTALL ACTUATOR**

Installation of the 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 degrees) to line up the actuator with the piping. The latch will click when engaged. See Figure 3.

   **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. See figure 4 for flexible conduit installation with plenum-cable models.

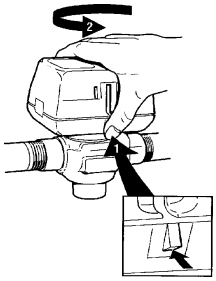


**Figure 3 - Latch Mechanism to detach Actuator**

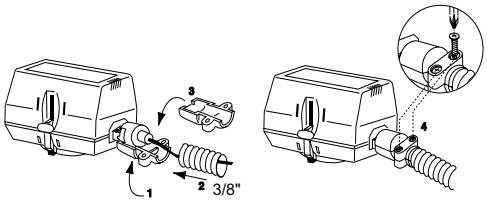



**Figure 4 - Flexible Conduit Attachment**

## WIRING (KVC6934)

**CAUTION:**

Disconnect power supply before connecting wiring to prevent electrical shock and equipment damage.

On 24 V systems, **never** jumper the valve coil terminals, even temporarily. This may damage the thermostat.

## OPERATIONS (KVC6934)

KVC6934 SERIES FLOATING CONTROLLER: (refer to **figure 5**)

The KVC6934 floating controller is a 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.

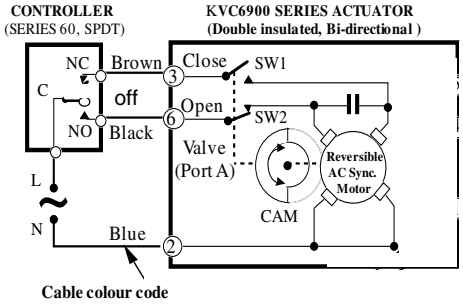



**Figure 5 - Internal wiring schematic for KVC6934**

**CHECK-OUT (KVC6934)**

**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.

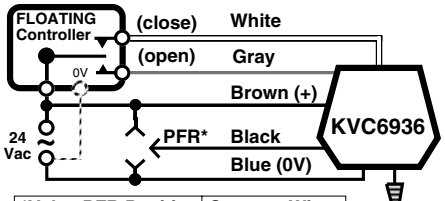
**WIRING (KVC6936)**

See **figure 6** 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.

## WIRING (KVC6936 continued)




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

**Fig. 6- Wiring color code for KVC6936 valve actuator, and Series 60 floating (Tristate) controller.**

### OPERATION

In the KVC6936, an electronic circuit compares the position of the motor to the signal voltage. If they are different, then the motor drives in the direction that will bring the circuit back into balance. Internal limit switches restrict the travel to the normal operating range. Because of the soft close off characteristic of the KVC Valve, initial (and final) movements of the actuator do not cause significant changes in the valve stem position.

### WITH SERIES 60 FLOATING (TRISTATE) CONTROLLER

**Refer to figure 6.**

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 KVC6936. 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 supercapacitors, and will resume normal operation on power up. On loss of signal, a KVC6936 wired for PFR-Open will open the A port fully. A KVC6936 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 24 V power to the PFR direction selection lead 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.

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### 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.*

### CHECK-OUT (KVC6936)

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 120 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 120 seconds.
5. Remove power from actuator. Actuator waits 5 seconds then drives valve to default position, i.e.: open (or close), in 12 seconds or less.
6. Restore power to 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 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:** These 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 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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