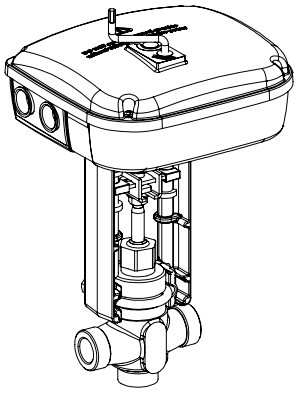
SpaceLogic M900A Series

IP54 (NEMA 2) and IP65 (NEMA 4) Spring Return Actuators



⚠ CAUTION

SPRING TENSION PRESENT

DISCONNECT POWER FOR MANUAL OVERRIDE OPERATION

- During manual override be aware of spring tension and hex key movement with this actuator. If the hex key remains in the hex drive socket it will rotate due to spring tension and/or power re-engaging.
- A pinch-point exists during installation of adapter/valve positioning during the manual override.

Failure to follow this warning may result in equipment damage or personal injury.

⚠ CAUTION

RISK OF BURNS OR FLYING PARTS

If the valve stem, spindle, or plug has been damaged, it may blow out under pressure while servicing the actuator.

- Isolate and depressurize the valve before servicing.
- Manually check valve stem, spindle, or plug integrity by moving it within the valve. If the part can be removed, replace the valve assembly.

Failure to follow these instructions may result in death or serious injury.

Product Description

The M900Axx valve actuator series use a brushless DC motor to accurately position the valve stem coupler via a gearbox, in accordance with the control signal received from the controller.

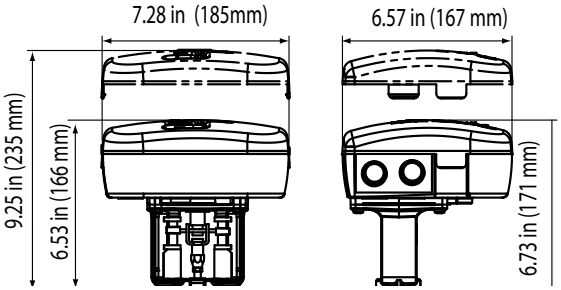
The first time the actuator is installed on a valve, a stroke calibration command must be executed by cycling switch 9 on and off while the actuator is powered. This initiates a full stroke cycle to learn the valve end stop positions and to calibrate the motor speed and actuator full stroke running time. Optional end switch point adjustment is also calibrated during this process.

In case of power loss, the actuator is equipped with a spring return function that returns the actuator back to the normal unpowered position. The actuator is available in either a spring return stem up (retracted) or stem down (extended) versions.

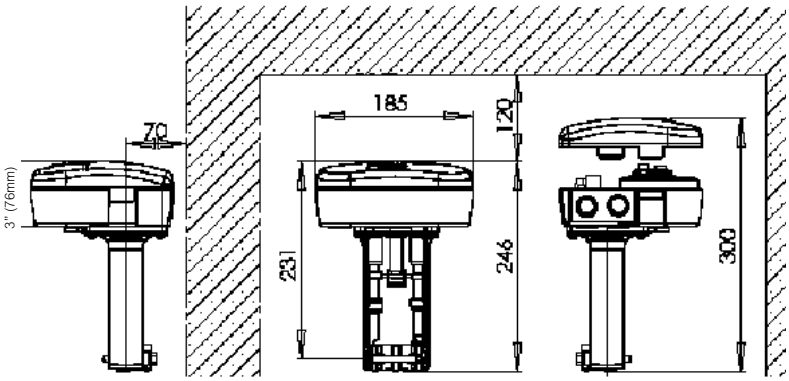
Features

- Mechanical spring return and brushless DC motor.
- Can be controlled by either a three-wire floating signal or by a modulating voltage/current signal.
- Field-configurable for direct or reverse action via a configuration DIP switch on the actuator controller board.
- Spring pretension ensures tight shut off and full opening on all valve ports.
- Equiped with a field selectable 2…10 or 0…5 Vdc output signal that is proportional to the calibrated stroke range
- Optional auxiliary switches are calibrated during the initial stroke calibration command.
- Maintenance free.

Dimensions



Dimensions for M900AR-VB and M900ARW-VB



Dimensions for M900AR, M900AE, M900ARW, M900ARW-S2, M900AEW-S2

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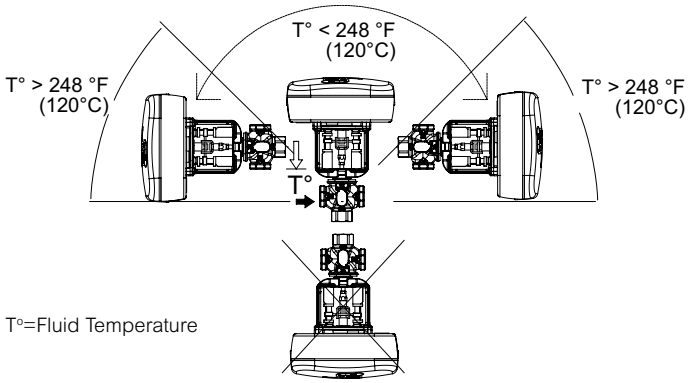
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Document Number: F-27683-5
January, 2022 tc

Mounting

The actuator may be mounted as shown.

Please note that to maintain NEMA 1/2 (IP40/IP54) rating of M900AE and M900AR, the actuators must be mounted vertically with at least one set of the conduit openings facing down.

The wires enter at the bottom through the connector and the supplied plugs must fill all Vacant openings. M900ARW-xx and M900AEW-xx NEMA 4 (IP65) rated actuators must have their conduit outlets facing downward or to the side (not up) with all conduit openings filled with water tight plugs or conduit connectors.



T°=Fluid Temperature

Available Products

Part Number	Spring Return	Tall U-Bolt Style [1]	Short Screw Mount Style [2]	NEMA 4 Enclosure Rating	Auxiliary Switches
M900AR	Retract	X			0
M900AE	Extend	X			0
M900AR-VB	Retract		X		0
M900ARW	Retract	X		X	0
M900ARW-VB	Retract		X	X	0
M900ARW-S2	Retract	X		X	2-SPDT
M900AEW-S2	Extend	X		X	2-SPDT

1 - VB-7xxx (1/2" to 2") and require AV-821*, VB-8xxx (2-1/2" to 4") and require AV-822*, and VB-9xxx (2-1/2" to 3") and require AV-822*
2 - For Direct VB-7xxx Mounting (No Linkage Required)
* Sold separately.

Manual Operation

NOTE: Prior to operating the manual override disconnect power to the actuator. M900AxW models have protective caps covering the manual override and lock hex slots and must be removed prior to using the override, then replaced after using manual override. The hex wrench if left in the hex override drive socket will rotate as the actuator is driven, so be sure to remove the hex wrench before the actuator is powered.

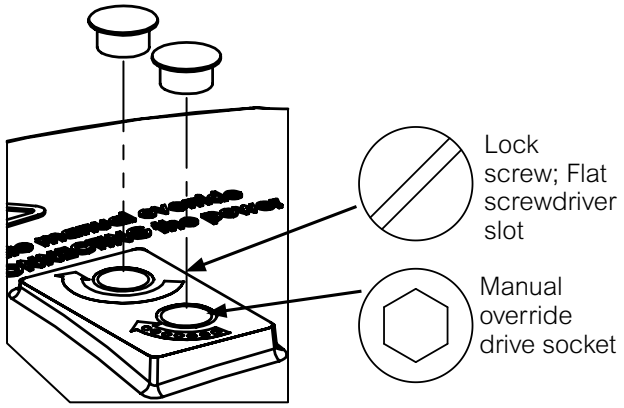
NOTE: The manual override should never be used to force the Jack screw into the valve end stops.

The manual override allows manual positioning of the valve and is automatically removed when power is restored.

The manual override can be done with the actuator's cover on or off. The operating direction of the manual override and lock screw are labeled on the cover. Operate the manual override and lock in one direction only.

The manual override is driven using a 5 mm (3/16") Hex (Allen) wrench (T-shaped recommended). The action of the manual override is always against the spring tension.

The actuator valve stem coupler position can be locked against the spring by turning the lock screw in the direction as shown



on the actuator cover. To engage the lock, insert a screwdriver in the lock screw slot, turn the screwdriver in the direction shown on the cover, and maintain tension in the proper direction. Allow the manual override to return slightly until the lock engages. To release the manual override lock, either nudge the manual override hex (Allen) wrench by 10° in the normal direction (against the spring) or restore power to the actuator.

Upon initial power up, the actuator momentarily drives against the spring to release the manual override lock before being driven by its input control signal.

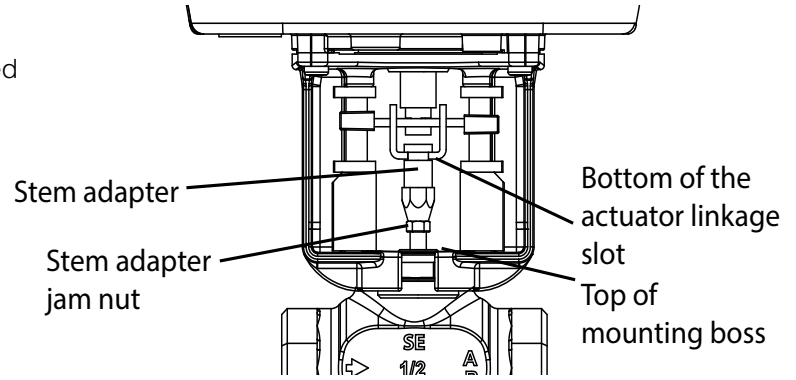
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Mechanical Installation

Installation on a 1/2"…2" VB-7000 (Short, Threaded e.g. M900ARx-VB)

Required Tools:

- M-370 1-5/8" open end wrench
- 7/16" open end wrench
- 5/16" open end wrench
- 5 mm (3/16") Hex (Allen) wrench 4" long min.
- Medium size flat blade screwdriver
- Ruler



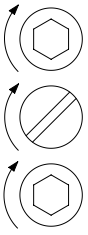
NOTE: The pump for the piping system serving the valve should be OFF or running at low speed during the calibration process.

NOTE: The manual override should never be used to force the Jack screw into the valve end stops.

NOTE: The actuator must be powered and the stroke calibrated with switch 9 (see the Programming and Calibration section) before it can properly respond to its input signal. Confirm that the factory-set dimension from the bottom of the actuator linkage slot to the top of the mounting boss is 7/8". If the actuator is not set at this dimension, adjust the actuator to obtain this 7/8" dimension by following the Manual Operation instruction.

1. Pull up the valve stem until it is fully extended.
2. Screw the stem adapter jam nut (provided with the actuator) to the bottom of the valve stem threads.
3. Using the 5/16" and 7/16" open end wrenches, screw the stem adapter (provided with the actuator) all the way onto the valve stem to the jam nut and tighten.
4. Slide the groove of the stem adapter in to the actuator linkage slot and position the actuator onto the valve.
5. Engage the large valve nut 1 to 2 turns on to the actuator yoke by hand (the valve stem may be pushed into the valve during this process).
6. For M900AxW NEMA 4 models only: Remove the sealing caps over the manual override holes to perform the manual override and replace sealing caps when finished.
7. Insert the 5 mm Allen wrench in the manual override socket
   - For AE model: turn the wrench approximately 3 full turns CCW, hold that position, and lock the manual override in place with a medium size flat blade screwdriver.*
   - This step must be taken to avoid possible internal damage to the valve. For AR model: Turn the wrench CW to unlock the manual override and then let the override turn approximately 3 full turns CCW, hold that position and lock the manual override in place with a medium size flat blade screwdriver. M900AxW (NEMA 4) models replace sealing caps.
8. Fully tighten the large valve nut to the actuator yoke using the M-370 1-5/8" open end wrench.
9. Mechanical installation is complete. Proceed to Wiring, followed by Programming and Calibration.

Spring Return Retract Models (M900ARx)

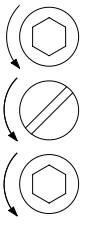


Manual override operation (extends actuator). Allen wrench required.

Lock operation (locks actuator in position). Flat blade screwdriver required.

Unlock operation. Turn manual override 10° and release. Allen wrench required.

Spring Return Extend Models (M900AEx)



Manual override operation (retracts actuator). Allen wrench required.

Lock operation (locks actuator in position). Flat blade screwdriver required

Unlock operation. Turn manual override 10° and release. Allen wrench required.

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Installation on a 1/2” – 2” VB-7000 (Tall, U-Bolt)

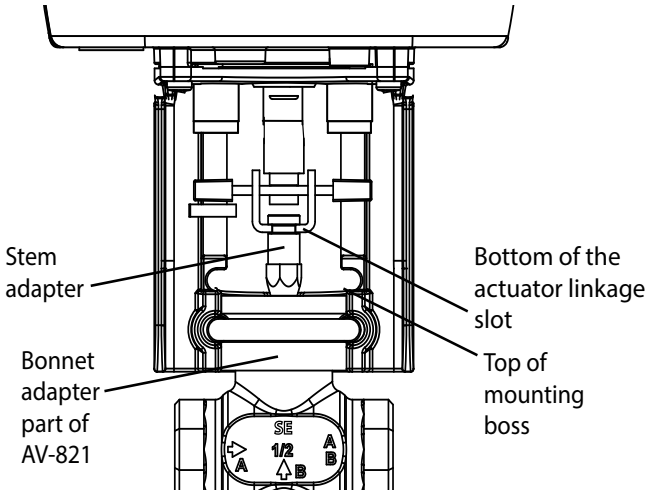
Required Tools:

- M-370 1-5/8” open end wrench
- 7/16” open end wrench
- 5/16” open end wrench
- Medium size flat blade screwdriver
- 13 mm wrench
- 5 mm (3/16”) Hex (Allen) wrench, 4” long minimum
- Medium size flat blade screwdriver
- Ruler

Required Linkages:

- AV-821 VB-7000 1/2”…2” valve linkage (purchased separately)

NOTE: The pump for the piping system serving the valve



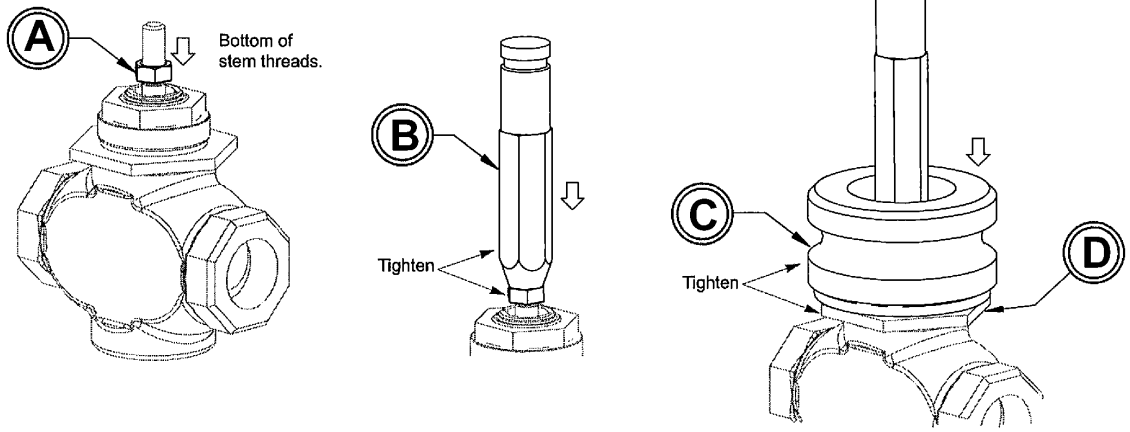
M900ARx Shown

should be OFF or running at low speed during the calibration process.

NOTE: It takes approximately 4-1/2 to 4-3/4 manual override turns to fully override the VB-7000 valve from full open to closed. The manual override should never be used to force the Jack screw into the valve end stops.

NOTE: The actuator must be powered and the stroke calibrated with switch 9 (see the Programming and Calibration section) before it will properly respond to its input signal.

1. Confirm that the factory set dimension from the bottom of the actuator linkage slot to the top of the mounting boss is 2¼”. If the actuator is not set at this dimension, adjust the actuator to obtain this dimension following the Manual Operation section.
2. Pull up the valve stem until it stops and is fully extended.
3. Screw the stem adapter jam nut (A) (provided with the AV-821) to the bottom of the valve stem threads.
4. Using the 5/16” and 7/16” open end wrenches, screw the stem adapter (B) (provided with the AV821) all the way on to the valve stem to the jam nut and tighten.
5. Install the AV-821 bonnet adapter (C) on the valve and tighten the valve nut (D) with the M-370 1-5/8” open end wrench.
6. Slide the groove of the stem adapter in to the actuator linkage slot and position the actuator onto the valve aligning the groove of the bonnet adapter with the U-bolt mounting holes in the actuator yoke.
7. For M900AxW NEMA 4 models only: Remove the sealing caps over the manual override holes to perform the manual override and replace sealing caps when finished.
8. Install the U-clamp and the two 13 mm U-clamp mounting nuts. Tighten with the 13 mm wrench.
9. Mechanical installation is complete. Proceed to Wiring, followed by Programming and Calibration.



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Installation on a 2-1/2"…4" VB-9313 (Tall, U-Bolt)

Required Tools:

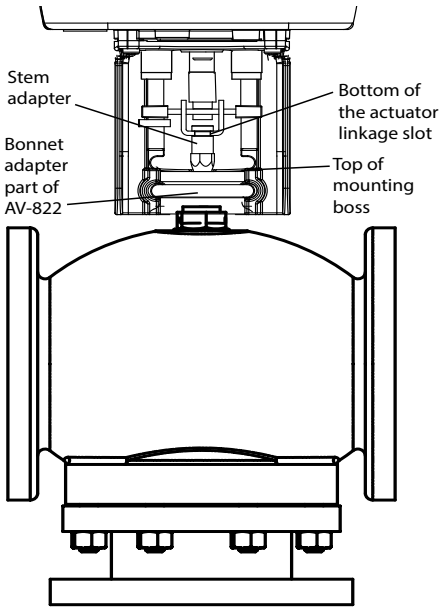
- 3/4" open end wrench
- 5/8" open end wrench
- 13 mm wrench
- Channel lock pliers
- 5 mm (3/16") Hex (Allen) wrench 4" long min.
- Medium size flat blade screwdriver
- Ruler

Required Linkages:

- AV-822 VB-9313 2-1/2"…4" valve linkage (purchased separately)

NOTE: The pump for the piping system serving the valve should be OFF or running at low speed during the calibration process.

NOTE: It takes approximately 7-1/2 turns to fully override the VB-9313 valve from its full open to full closed position. The manual override should never be used to force the Jack screw into the valve end stops.



NOTE: The actuator must be powered and the stroke calibrated with switch 9 (see the Programming and Calibration section) before it will properly respond to its input signal.

1. Confirm that the factory set dimension from the bottom of the actuator linkage slot to the top of the mounting boss is 2¼". If the actuator is not set at this dimension, adjust the actuator to obtain this dimension following the Manual Operation section.
2. Pull up the valve stem.
3. Screw the stem adapter jam nut (A) (provided with the AV-822) 1/2" down the valve stem threads.
4. Screw the stem adapter (B) (provided with the AV-822) on to the valve stem to the jam nut, using the 3/4" and 5/8" open end wrenches, and tighten.
5. Thread the valve nut (D) down until a minimum of 1/2" of bonnet threads are exposed, then install the bonnet adapter (C) to the valve body bonnet and thread down until it bottoms on the bonnet. Firmly hold the bonnet adapter (C) and tighten the valve nut (D) with the channel lock pliers.
6. Slide the groove of the stem adapter in to the actuator linkage slot and position the actuator onto the valve aligning the grove of the bonnet adapter with the U-bolt mounting holes in the actuator yoke.
7. Install the U-clamp and the two 13 mm U-clamp mounting nuts and tighten with the 13 mm wrench.
8. Mechanical installation is complete. Proceed to Wiring, followed by Programming and Calibration.

Spring Return Retract Models (M900ARx)



Manual override operation (extends actuator). Allen wrench required.



Lock operation (locks actuator in position). Flat blade screwdriver required.



Unlock operation. Turn manual override 10° and release. Allen wrench required.

Spring Return Extend Models (M900AEx)



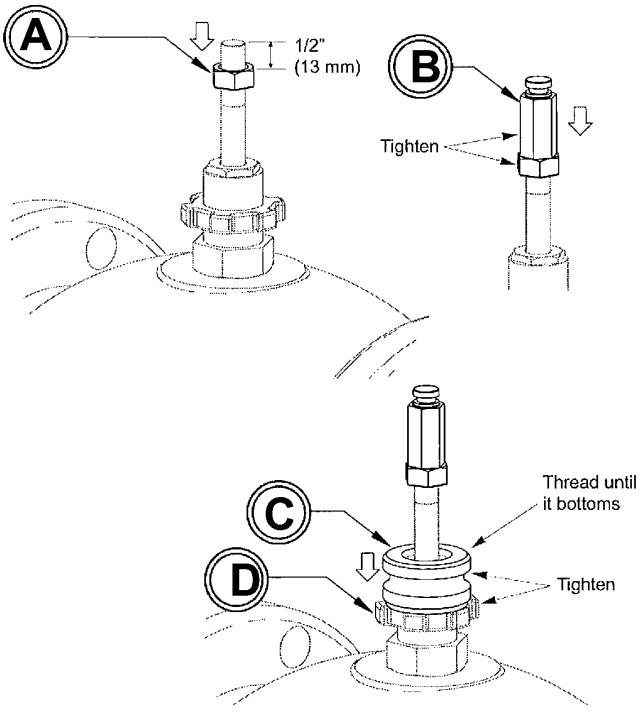
Manual override operation (retracts actuator). Allen wrench required.



Lock operation (locks actuator in position). Flat blade screwdriver required



Unlock operation. Turn manual override 10° and release. Allen wrench required.



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Wiring

Wire lengths

Use a maximum of 328' (100 m) and 16 AWG for the power wires to H and G, with the wires connected to one actuator. For all other control wires, use a maximum of 656' (200 m) and 20 AWG wire. The maximum wire gauge is 12 AWG.

Caution: When installed with 3 conductors, where the control signal reference is connected to G, the motor current of the actuator causes varying voltage loss in the cable and thus in the reference level. The M900Ax has highly sensitive control circuitry that can be influenced by interference in the control signal which the actuator can try to follow. This influence may be reduced in simple installations by shortening the cable lengths below 328' (100 m) and /or increasing the cross sectional area of the wire gauge above 16 AWG connected to only one actuator.

Electrical Connections

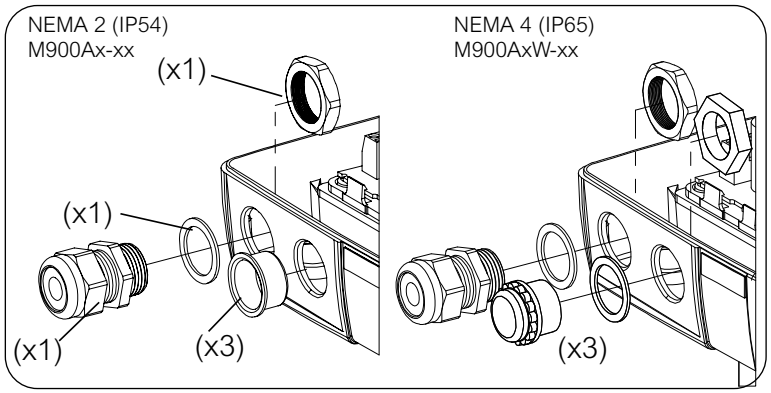
Terminal	Function	Description
A0	0-100% of valve position	Position feedback signal
A1	Proportional input	Proportional control signal
C	Proportional and position feedback common	
D1	Three-wire floating input	D1, D2 connected to G to extend/ retract
D2	Three-wire floating input	
*	16 Vdc Output	External supply, 25 mA max
G	24 Vac / -Vdc Common	Supply voltage
H	24 Vac / +20 to 29 Vdc	

Conduit Wiring Requirements for M900AxW-xx NEMA 4 Models

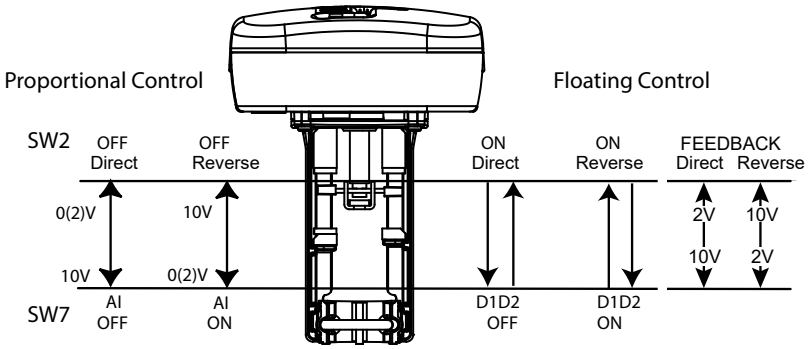
The M900AxW-xx electrical wiring must use a 1/2" NPT water tight conduit connector and matching water tight flexible conduit (not provided with the actuator). Three 1/2" NPT water tight plugs are provided with each **SpaceLogic** M900AxW actuator to plug the unused conduit holes. One or more of these water tight plugs can be replaced by additional 1/2" NPT water tight conduit connectors and matching water tight flexible conduit if it is necessary to use more than one conduit for the electrical wiring.

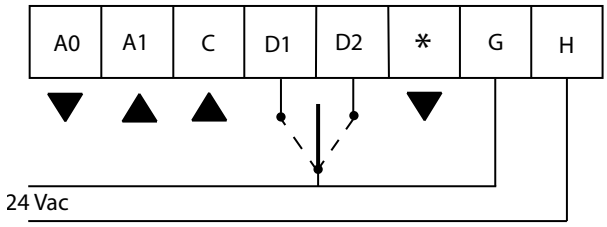
Cover Installation Requirements for M900AxW-xx NEMA 4 Models

Install the M900AxW-xx cover with the four cover screws and seals. Ensure the manual override socket, the manual override lock caps, and the cover perimeter gasket seal are intact.

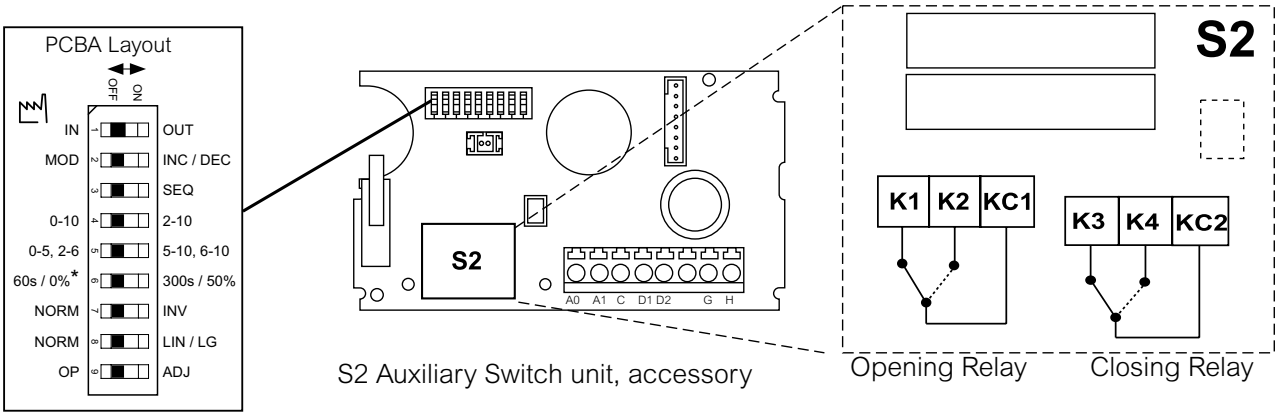


Connections/PCB Layout





* Provides 16 Vdc, 25 mA output source

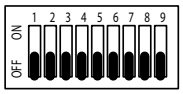


S2 Auxiliary Switch unit, accessory

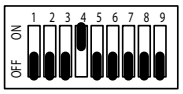
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Wiring Examples

PROPORTIONAL (MODULATING) CONTROL WIRING DIAGRAMS

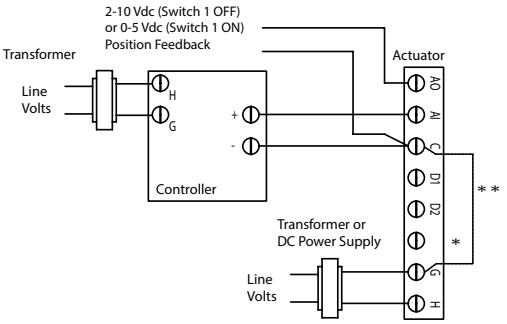


Switches 2 & 4 OFF
0-10V
Proportional operation

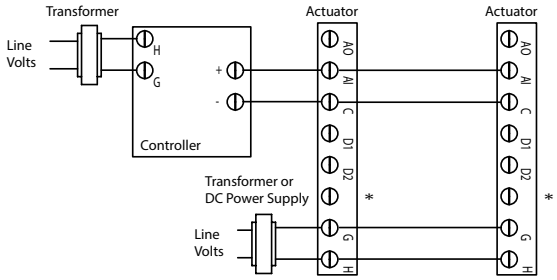


Switches 2 OFF & 4 ON
2-10V
Proportional operation

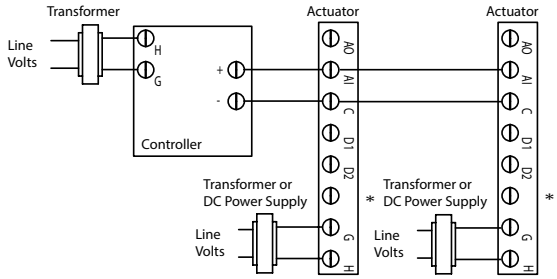
TRANSFORMER OR DC POWER SUPPLY TO BE SIZED FOR RECOMMENDED VA REQUIREMENTS PER CONTROLLER/ACTUATOR PRODUCT DATA SHEETS



0-10/2-10 Vdc Proportional Application
* Provides 16 Vdc, 25 mA output source
** Optional Ground connection



0-10/2-10 Vdc Proportional Multiple
Actuators powered from single source.
* Provides 16 Vdc, 25 mA output source

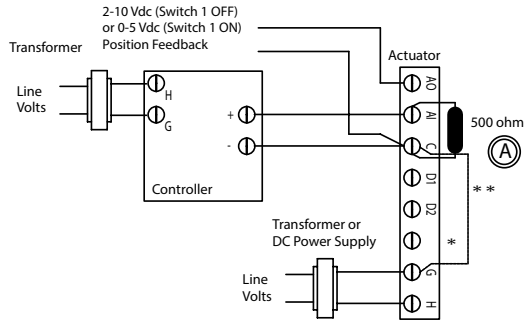


0-10/2-10 Vdc Proportional Multiple
Actuators powered from separate sources.
* Provides 16 Vdc, 25 mA output source

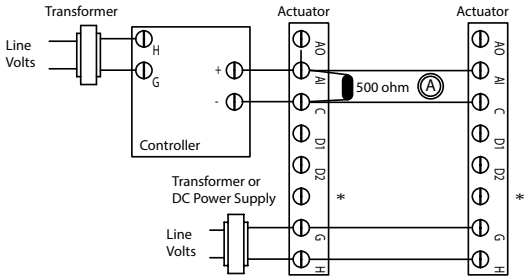


Switches 2 OFF & 4 ON
4-20mA with 500 ohm resistor
Proportional operation

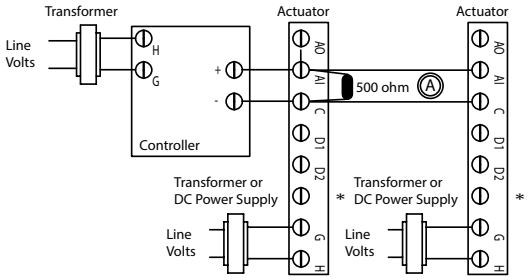
TRANSFORMER OR DC POWER SUPPLY TO BE SIZED FOR RECOMMENDED VA REQUIREMENTS PER CONTROLLER/ACTUATOR PRODUCT DATA SHEETS



4-20 mA Proportional Application
* Provides 16 Vdc, 25 mA output source
** Optional Ground connection



4-20 mA Proportional Multiple
Actuators powered from single source.
* Provides 16 Vdc, 25 mA output source

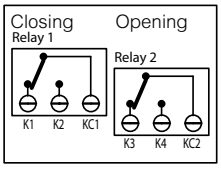


4-20 mA Proportional Multiple
Actuators powered from separate sources.
* Provides 16 Vdc, 25 mA output source

Ⓐ 500 ohm resistor (included w/actuator) is required.
For 4-20mA input Dip Switches 2 OFF and 4 ON

Caution: This product contains a half-wave rectifier power supply and must not be powered off transformers used to power other devices utilizing non-isolated full-wave rectifier power supplies.

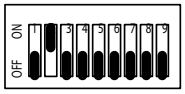
Refer to EN-205, Guidelines for Powering Multiple Devices from a Common Transformer, F-26363 for detailed information



OPTIONAL S2 AUXILIARY SWITCH

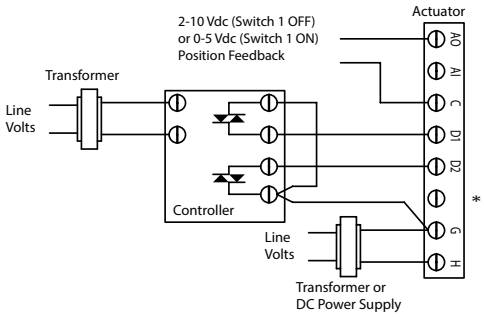
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FLOATING (3-WIRE) CONTROL WIRING DIAGRAMS

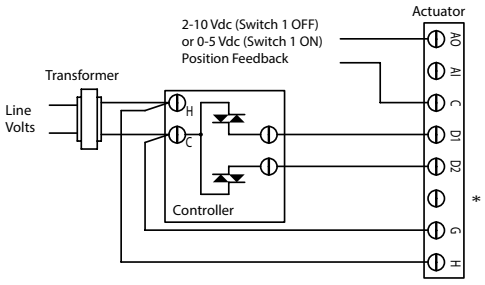


Switch 2 ON for floating operation

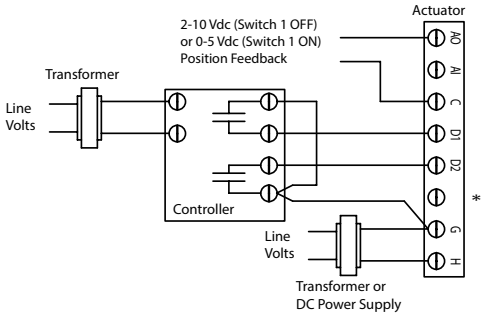
TRANSFORMER OR DC POWER SUPPLY TO BE SIZED FOR RECOMMENDED VA
REQUIREMENTS PER CONTROLLER/ACTUATOR PRODUCT DATA SHEETS



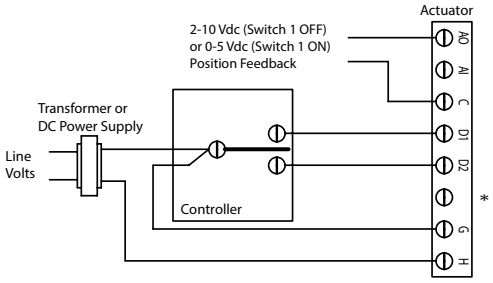
TRIAC SINK Application
Two power sources
* Provides 16 Vdc, 25 mA output source



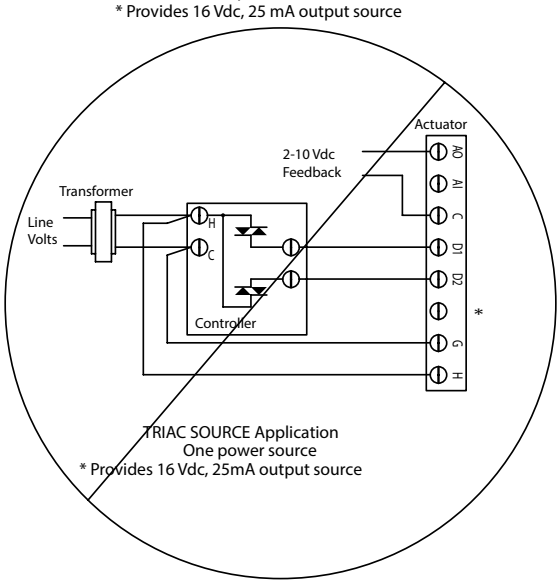
TRIAC SINK Application
One power source
* Provides 16 Vdc, 25 mA output source



RELAY SINK Application
Two power sources
* Provides 16 Vdc, 25 mA output source

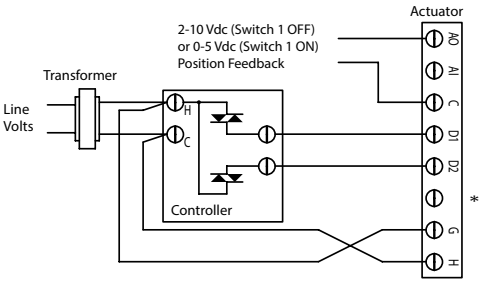


RELAY SINK Application
One power source
* Provides 16 Vdc, 25 mA output source



TRIAC SOURCE Application
One power source
* Provides 16 Vdc, 25mA output source

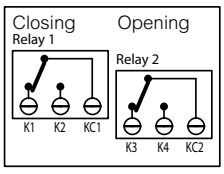
DO NOT WIRE AS SHOWN



TRIAC SOURCE Application
One power source
* Provides 16 Vdc, 25 mA output source

Note:

If AC polarity cannot be determined, a separate transformer must power each controller and actuator.



OPTIONAL S2 AUXILIARY SWITCH

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Programming and Calibration

DIP Switch Configuation Overview Table

When shipped from the factory, all DIP switches are in the OFF position. Upon initial setup and installation, set switches 1 through 8 before applying power to the actuator. After initial power up, use switch 9 to initiate a manual calibration (instructions below). If the DIP switches are changed while the actuator is powered, then power cycle the actuator for the changes to take effect. Perform another manual calibration (switch 9) at this time.

<table>
<tr><th>Sw</th><th>Switch Function</th><th>Description of Function Controlled by This Switch</th><th>Switch Options</th></tr>
<tr><td>1</td><td>Feedback output voltage signal</td><td>Selects either 2…10 Vdc or 0…5 Vdc output range
• Provides a voltage proportional to the position of the valve stem position as a percentage of full open position (e.g. if switch 1 is set to 0…5 Vdc and the valve stem is at 50% of travel, the output is 2.5 Vdc)
• Signal appears on the AO terminal, referenced to the C terminal</td><td>OFF = 2…10 Vdc output range
ON = 0…5 Vdc output range</td></tr>
<tr><td>2</td><td>Input control signal mode</td><td>Selects either proportional (modulating) or floating (3-wire) input control signal mode.
• This determines which mode the actuator will use as its control signal, either proportional or floating.
• See the proportional and floating control wiring diagrams for more information</td><td>OFF = proportional signal input
ON = floating signal input</td></tr>
<tr><td>3</td><td>Normal or Sequence mode</td><td>Selects either normal (full scale) or sequence (half scale) mode
• If normal mode is selected, the full scale input voltage range is selected using switch 4.
• If sequence mode is selected, the half scale input voltage range is selected using switch 4 and switch 5.
• Switch 2 must be OFF to use this selection</td><td>OFF = normal mode; use switch 4 to select the full scale input voltage range
ON = sequence mode; use switch 4 and switch 5 to select the half scale input voltage range</td></tr>
<tr><td>4</td><td>Proportional control signal voltage range</td><td>Selects either 0-10 Vdc or 2…10 Vdc full input voltage range to be used by the proportional mode controller with switch 2 = OFF and switch 3 = OFF.
• Proportional mode controller must be used when 4…20 mA control (using included resistor) is desired</td><td>OFF = 0-10 Vdc
ON = 2…10 Vdc or 4…20 mA with included 500 ohm resistor</td></tr>
<tr><td>5</td><td>Sequence input voltage range (used only if switch 2 = OFF and switch 3 = ON)</td><td>Together with switch 4, selects one of four half scale input voltage ranges that are used in proportional or sequence mode</td><td><table><tr><th>Input Range</th><th>Sw 2</th><th>Sw 3</th><th>Sw 4</th><th>Sw 5</th></tr><tr><td>0…5 Vdc</td><td>OFF</td><td>ON</td><td>OFF</td><td>OFF</td></tr><tr><td>2…6 Vdc</td><td>OFF</td><td>ON</td><td>ON</td><td>OFF</td></tr><tr><td>5…10 Vdc</td><td>OFF</td><td>ON</td><td>OFF</td><td>ON</td></tr><tr><td>6…10 Vdc</td><td>OFF</td><td>ON</td><td>ON</td><td>ON</td></tr></table></td></tr>
<tr><td>6</td><td>Floating control actuator speed</td><td>Selects either 60 second or 300 second “close to open” running time for the actuator
• To be used in floating mode applications only
• Switch 2 must be ON to use this selection</td><td>OFF = 60 sec. close to open travel time
ON = 300 sec. close to open travel time</td></tr>
<tr><td>7</td><td>Proportional Control Direction of movement with SW2 OFF</td><td>Selects either direct acting or reverse acting mode
• As input control signal increases, the following table shows the behavior of the actuator<table><tr><th>Mode</th><th>M900ARx</th><th>M900AEx</th></tr><tr><td>Normal (OFF)</td><td colspan="2">extends</td></tr><tr><td>Reverse (ON)</td><td colspan="2">retracts</td></tr></table></td><td>OFF = Direct
ON = Reverse</td></tr>
<tr><td>7</td><td>Floating Control Direction of movement with SW2 ON</td><td>Selects either direct acting or reverse acting mode
• As input control signal increases, the following table shows the behavior of the actuator<table><tr><th>Mode</th><th>M900ARx</th><th>M900AEx</th></tr><tr><td>Direct (OFF)</td><td colspan="2">D1 extends, D2 retracts</td></tr><tr><td>Reverse (ON)</td><td colspan="2">D1 retracts, D2 extends</td></tr></table></td><td>OFF = Direct
ON = Reverse</td></tr>
<tr><td>8</td><td>Flow mode</td><td>Selects either normal or linearization control mode
• Normal mode provides linear control movement of the valve stem
• Linearization mode applies a logarithmic function to cause an equal percentage valve to emulate a linear valve (or a linear valve to emulate a fast-opening valve
• Switch 2 must be OFF to use this selection</td><td>OFF = Normal
ON = Linearization</td></tr>
<tr><td>9</td><td>Stroke calibration initiation</td><td>Used to calibrate the input signal and the valve stroke
• Power to the actuator must be on then cycle Sw9 off to on to off to initiate calibration function which can take up to one minute to complete calibration with the pump off or in low speed.</td><td>OFF = Normal operation
OFF to ON to OFF = Initiate calibration</td></tr>
</table>

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DIP Switch Combinations
Input Control Signal Input

Proportional (Modulating)

Input Signal Setup	Switch 2	Switch 3	Switch 4	Switch 5
Full Input Voltage Range (Normal Control)				
0…10 Vdc	OFF	OFF	OFF	-
2…10 Vdc			ON	
Small Input Voltage Range (Sequence Control)				
0…5 Vdc	OFF	ON	OFF	OFF
2…6 Vdc			ON	OFF
5…10 Vdc			OFF	ON
6…10 Vdc			ON	ON

Floating (3-Wire)

Input Signal Setup	Switch 2	Switch 6	Switch 7
Direct Acting Control			
Running time: 60 Sec.	ON	OFF	OFF
Running time: 300 sec.		ON	OFF
Reverse Acting Control			
Running time: 60 Sec.	ON	OFF	ON
Running time: 300 sec.		ON	ON

Valve Options:
Two-Way Valve Operation with Proportional Input Signal

Two-Way Valve	Valve Body Stem Up Water Flow	Unpowered Valve Assembly Water Flow	Sw 7	Low End of Input Signal Range (2 Vdc)			High End of Input Signal Range (10 Vdc)		
				Water Flow	Actuator Position	Position Feedback Signal	Water Flow	Actuator Position	Position Feedback Signal
VB-721x, VB-7253, VB-7273	Full Flow		Off	Full Flow	Retracted	Low (0 Vdc)	No Flow	Extended	High (5 Vdc)
			On	No Flow	Extended		Full Flow	Retracted	
VB-722x, VB-7263, VB-7283	No Flow		Off	No Flow	Retracted		Full Flow	Extended	
			On	Full Flow	Extended		No Flow	Retracted	

The actuator is set up for a 2 to 10 Vdc Input Signal (switch 2 = OFF and switch 4 = ON) and 0 to 5 Vdc Position Feedback Signal (switch 1 = ON). Note: In proportional control mode, if the control signal is lost the actuator moves to the low signal input position. On loss of power, the actuator moves to the spring return position.

Three-Way Valve Operation with Proportional Input Signal

Three-Way Valve	Valve Body Stem Up Water Flow	Unpowered Valve Assembly Water Flow	Sw 7	Low End of Input Signal Range (2 Vdc)			High End of Input Signal Range (10 Vdc)		
				Water Flow	Actuator Position	Position Feedback Signal	Water Flow	Actuator Position	Position Feedback Signal
VB-731x, VB-732x, VB-9313	B to AB	B to AB	Off	Mix B to AB, Div. B to AB	Retracted	Low (0 Vdc)	Mix A to AB, Div. B to A	Extended	High (5 Vdc)
			On	Mix A to AB, Div B to A	Extended		Mix B to AB, Div B to AB	Retracted	

The actuator is set up for a 2 to 10 Vdc Input Signal (switch 2 = OFF and switch 4 = ON) and 0 to 5 Vdc Position Feedback Signal (switch 1 = ON). VB-731x is mixing, VB-732x is diverting and VB-9313 is mixing. See Figure 1 for three-way valve flow paths.

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Two-Way Valve Operation with Floating Input Signal

Two-Way Valve	Valve Body Stem Up Water Flow	Unpowered Valve Assembly Water Flow	Sw 7	Full D1 Position*			Full D2 Position*		
				Water Flow	Actuator Position	Position Feedback Signal	Water Flow	Actuator Position	Position Feedback Signal
VB-721x, VB-7253, VB-7273	Full Flow	Full Flow	Off	No Flow	Extended	High (5 Vdc)	Full Flow	Retracted	Low (0 Vdc)
			On	Full Flow	Retracted		No Flow	Extended	
VB-722x, VB-7263, VB-7283	No Flow	No Flow	Off	Full Flow	Extended		No Flow	Retracted	
			On	No Flow	Retracted		Full Flow	Extended	

The actuator is set up for a Floating Input Signal (switch 2 = ON) and 0 to 5 Vdc Position Feedback Signal (switch 1 = ON).

* Refer to wiring terminals on page 8.

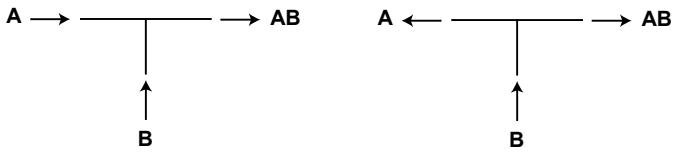
Three-Way Valve Operation with Floating Input Signal

Three-Way Valve	Valve Body Stem Up Water Flow	Unpowered Valve Assembly Water Flow	Sw 7	Full D1 Position*			Full D2 Position*		
				Water Flow	Actuator Position	Position Feedback Signal	Water Flow	Actuator Position	Position Feedback Signal
VB-731x, VB-732x, VB-9313	B to AB	B to AB	Off	Mix A to AB, Div. B to A	Extended	High (5 Vdc)	Mix B to AB, Div. B to AB	Retracted	Low (0 Vdc)
			On	Mix B to AB, Div B to AB	Retracted		Mix A to AB, Div B to A	Extended	

The actuator is set up for a Floating Input Signal (switch 2 = ON) and 0 to 5 Vdc Position Feedback Signal (switch 1 = ON). VB-731x is mixing, VB-732x is diverting and VB-9313 is mixing. See Figure 1 for three-way valve flow paths.

* Refer to wiring terminals on page 8.

Figure 1. Three-way Valve Flow Patterns



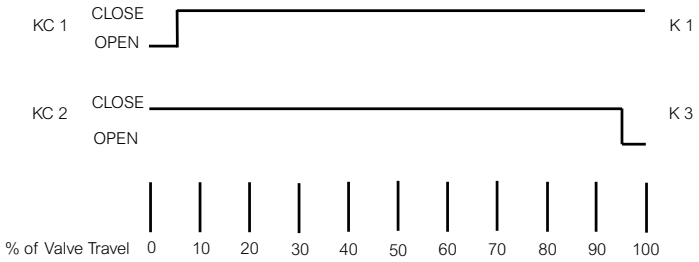
VB-731x 1/2” to 2”
VB-9313 2-1/2” to 4”
Three Way Mixing

VB-732x 1/2” to 2”
Three Way Diverting

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Auxiliary Switch Functionality

Switch action shown below is for "Auxiliary Switch" in either M900AR or M900AE with initial position (0% valve travel) as power-up position. The optional auxiliary switch which is actually two SPDT switches. One of these transfers at approximately 5% of retracted calibrated stroke and the other transfers at approximately 5% of extended calibrated stroke.



Switch 7 Auxiliary Switch Operation with Proportional Input Signal

Switch 7	Proportional Input Signal	Actuator Position	Auxiliary Switch Relay 1		Auxiliary Switch Relay 2	
			KC1 - K1	KC1 - K2	KC2 - K3	KC2 - K4
Off	2 Vdc	Retracted	Open	Closed	Closed	Open
Off	10 Vdc	Extended	Closed	Open	Open	Closed
On	2 Vdc	Extended	Open	Closed	Closed	Open
On	10 Vdc	Retracted	Closed	Open	Open	Closed

Actuator is set up for a 2 to 10 Vdc input signal.

Switch 7 Auxiliary Switch Operation with Floating Input Signal

Switch 7	Floating Input signal	Actuator Position	Auxiliary Switch Relay 1		Auxiliary Switch Relay 2	
			KC1 - K1	KC1 - K2	KC2 - K3	KC2 - K4
Off	D1	Extended	Closed	Open	Open	Closed
Off	D2	Retracted	Open	Closed	Closed	Open
On	D1	Retracted	Closed	Open	Open	Closed
On	D2	Extended	Open	Closed	Closed	Open

Actuator is set up for a floating input signal.

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