

## ML6421, ML7421 Non-Spring Return Electric Linear Valve Actuators

PRODUCT DATA



### FEATURES

- Quick and easy installation.
- No separate linkage required.
- 3/4 in. (20 mm) stroke on ML6421A and ML7421A.
- 1-1/2 in. (38 mm) stroke on ML6421B and ML7421B.
- No adjustments required.
- Accurate valve positioning.
- Low power consumption.
- Selectable 0(2) to 10 Vdc or 0(4) to 20 mA input signal with ML7421.
- Position feedback with ML7421.
- High close-off ratings.
- Direct/reverse acting with ML7421.
- Force-limiting end switches.
- Manual operator.
- Synchronous motor.
- Corrosion-resistant design.
- Maintenance free.
- Conduit connector knockout.

### APPLICATION

The ML6421A,B Non-Spring Return Electric Linear Valve Actuators are suitable for use with low-voltage, single-pole double-throw (spdt), Series 60 two-position and floating controllers. These actuators operate standard Honeywell valves in heating, ventilating, and air conditioning (HVAC) applications.

The ML7421A,B Non-Spring Return Electric Linear Valve Actuators are modulating control actuators used with controls that provide an analog output of 0 to 10 Vdc or 2 to 10 Vdc. These actuators operate standard Honeywell valves in HVAC applications. An internal selector plug can be used to reverse the direction of action.

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## SPECIFICATIONS

### Models:

Model	Stroke in in. (mm)	Run Time in sec at 60 Hz	Description
ML6421A	3/4 (20)	95	Electric Linear Valve Actuator
ML7421A			
ML6421B	1-1/2 (38)	175	
ML7421B			

**Dimensions:** See Fig. 1.

**Weight:** 5.1 lb (2.3 kg).

### Electrical Ratings:

Power Input: 24 Vac (+10%, -15%), 60 Hz.

Power Consumption: 11 VA maximum at 24 Vac.

### Signal Inputs:

ML6421:

24 Vac across T1 and W: Drives stem downward.

24 Vac across T2 and B: Draws stem upward.

ML7421: 0 to 10 Vdc or 2 to 10 Vdc.

### Actuator Material:

Cover: ABS plastic.

Yoke and Base: Diecast aluminum.

**Stem Force:** 405 lbf (1800N).

**Close-off Pressure Ratings:** See Table 1.

**Cable Entry:** Two knockout holes for 1/2 in. conduit standard on actuator case.

### Ambient Ratings:

Temperature:

Ambient Range: 14°F to 122°F (-10°C to +50°C).

Storage Range: -40°F to +158°F (-40°C to +70°C).

Humidity Range: 5 to 95 percent relative humidity, noncondensing.

### Approvals:

Canadian Standards Association Listed.

Underwriter's Laboratories, Inc. UL94-5V Flame Retardant (file E181716).

Meets CE requirements.

**Protection Standard:** IP54.

### Accessories:

43191679-101 Single Auxiliary Potentiometer for ML6421A.

43191679-102 Single Auxiliary Potentiometer for ML6421B.

43191679-103 Dual Auxiliary Potentiometer for ML6421A.

43191679-104 Dual Auxiliary Potentiometer for ML6421B.

43191680-102 Dual Auxiliary Switch (for 24 Vac use *only*).

43196000-001 High Temperature Kit (for actuators with 3/4 in. stroke). Increases maximum temperature to 428°F (220°C).

43196000-102 High Temperature Kit (for actuators with 1-1/2 in. stroke). Increases maximum temperature to 428°F (220°C).

**Table 1. Close-off Ratings for ML6421, ML7421 Electric Linear Valve Actuators and Honeywell Valves (psi).**

Type	Valve	1/2 in.	3/4 in.	1 in.	1-1/4 in.	1-1/2 in.	2 in.	2-1/2 in.	3 in.	4 in. <sup>a</sup>	5 in. <sup>a</sup>	6 in. <sup>a</sup>
Flange	V5011A,B,C	—	—	—	—	—	—	77	53	29	18	12
	V5011B	—	—	—	—	—	—	—	—			
	V3350/51/60/61;V3450/51/60/61	—	—	—	—	—	—	63 <sup>b</sup>	45 <sup>b</sup>	25 <sup>b</sup>	16 <sup>b</sup>	11 <sup>b</sup>
NPT	V5011F,G	150 <sup>c</sup>	150 <sup>c</sup>	150 <sup>c</sup>	150 <sup>c</sup>	150 <sup>c</sup>	150 <sup>c</sup>	100	61	—	—	—
	V5011N1xxx, V5011N3xxx, V5013N	230	230	230	230	230	126	—	—			
	V5011N2xxx	100 <sup>d</sup>	100 <sup>d</sup>	100 <sup>d</sup>	100 <sup>d</sup>	100 <sup>d</sup>	100 <sup>d</sup>	—	—			
	V5013F	150	150	150	150	150	150	—	—			

<sup>a</sup> For use with ML6421B or ML7421B Actuators only.

<sup>b</sup> Represents maximum pressure difference between the outlet and either of the two inlets.

<sup>c</sup> Do not exceed 100 psi with V5011G valves used in steam applications.

<sup>d</sup> Rating is for steam at maximum 100 psi. Ratings for water applications are the same as for the V5011N1xxx.

## ORDERING INFORMATION

When purchasing replacement and modernization products from your TRADELINE® wholesaler or distributor, refer to the TRADELINE® Catalog or price sheets for complete ordering number.

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 (check white pages of your phone directory).
2. Home and Building Control Customer Relations  
Honeywell, 1885 Douglas Drive North  
Minneapolis, Minnesota 55422-4386

In Canada—Honeywell Limited/Honeywell Limitée, 35 Dynamic Drive, Scarborough, Ontario M1V 4Z9.

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.

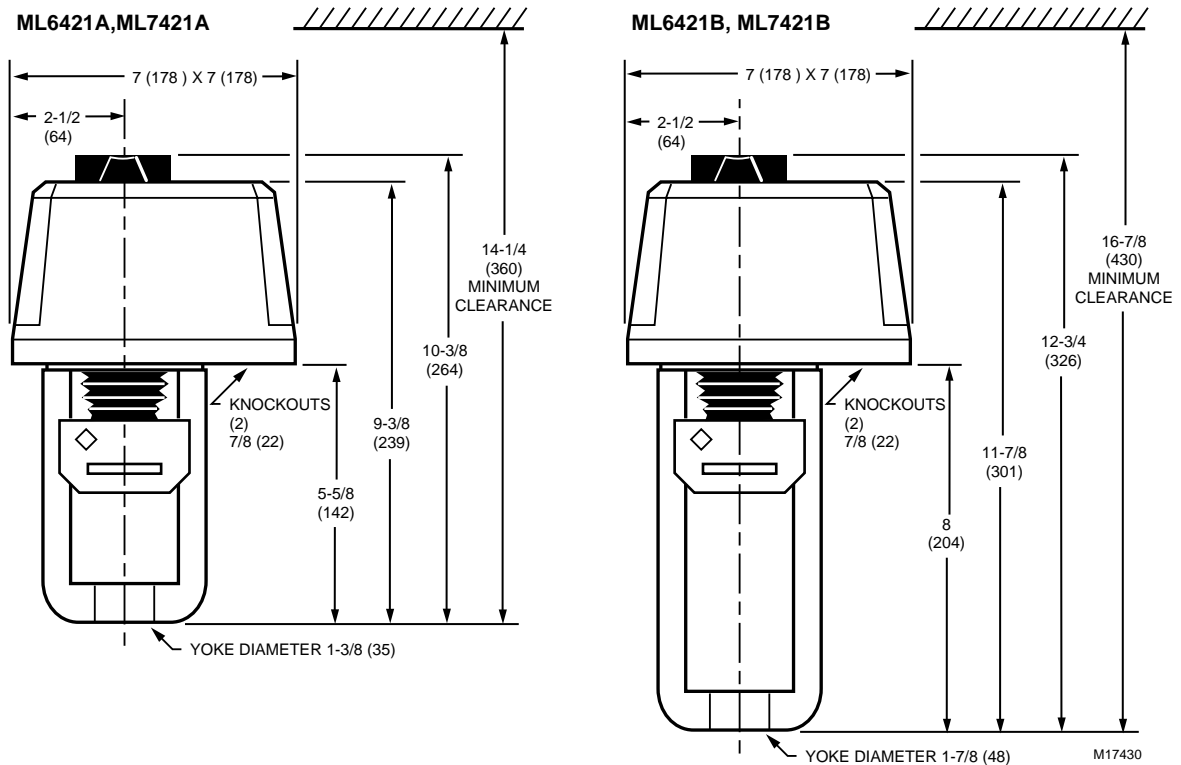


Fig. 1. Approximate dimensions of ML6421, ML7421 Electric Linear Valve Actuators in in. (mm).

## INSTALLATION

### When Installing this Product...

1. Read instructions carefully. Failure to follow them could damage the product or cause a hazardous condition.
2. Check ratings and description given in the specifications to make sure the product is suitable for your application.
3. Installer must be a trained, experienced service technician.
4. After installation is complete, check out product operation as provided in these instructions.



### CAUTION

**Electrical Shock or Equipment Damage Hazard.**  
Can shock individuals or short equipment circuitry.  
Disconnect power supply before installation.

### Location

Install the actuator in a location that allows enough clearance for mounting accessories and for servicing.



### CAUTION

**Equipment Damage Hazard.**  
Can damage actuator due to condensation or a valve gland leak.  
Install the actuator in a position above horizontal.

## Mounting

1. Place the actuator on the valve with the U-bolt around the valve collar. See Fig. 2.

### IMPORTANT

*When tightening the set screws, first tighten the right set screw. See Fig. 2.*

2. Place the U-bolt against the valve collar and secure the actuator to the valve by turning each U-bolt nut clockwise.

**NOTE:** To assure even pressure on the collar, first tighten the nuts finger-tight and then alternate turning each U-bolt nut until both are snug.

3. Push aside the stem button retaining clip and hold. See Fig. 2.
4. Lift the valve stem until the head of the valve stem button is inside the large slot of the stem button retaining clip on the actuator.
5. Release the stem button retaining clip to secure the stem button. Check to make certain the stem button is secured by the retaining clip.
6. Pull off the manual operation knob.
7. Remove the cover from the actuator using a Phillips or crosspoint screwdriver. See Fig. 3.

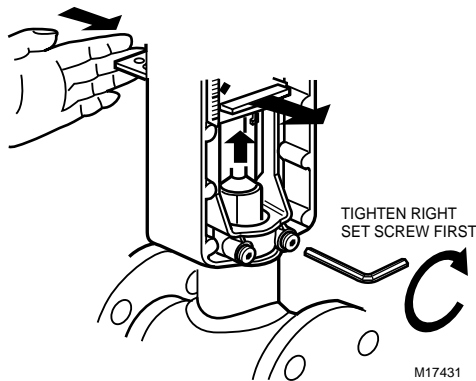


Fig. 2. Attaching actuator to valve.

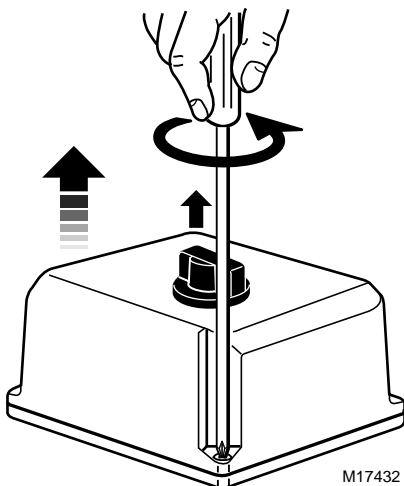


Fig. 3. Removing actuator cover.

## Wiring



### CAUTION

**Electrical Shock or Equipment Damage Hazard.**  
**Can shock individuals or short equipment circuitry.**

Disconnect power supply before installation.

### IMPORTANT

1. All wiring must comply with local electrical codes, ordinances and regulations.
2. Voltage and frequency of the transformer used with the actuator must correspond with the characteristics of the power supply and those of the actuator.

**NOTE:** See Fig. 5 through 8 for typical wiring hookups.

1. Feed power and control wires through the conduit connector located on the bottom of the actuator case.



### CAUTION

**Equipment Damage Hazard.**  
**Conduit connection or removal can break an unsupported connector.**

When removing or attaching conduit, use a wrench to support the motor connector.

2. Using the appropriate wiring diagram (see Fig. 5 through 8), connect power and control wires to the actuator. Make sure that all wiring is correct.
3. For the ML7421 only: Check selector plugs for proper settings. See Signal Input Failure section for details.
4. When wiring is complete, replace the actuator cover and control knob (see Fig. 9).
5. Apply power and control signals to the actuator.

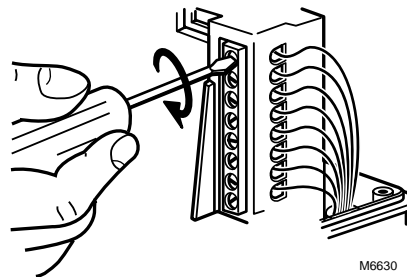


Fig. 4. Connecting wiring to the actuator.

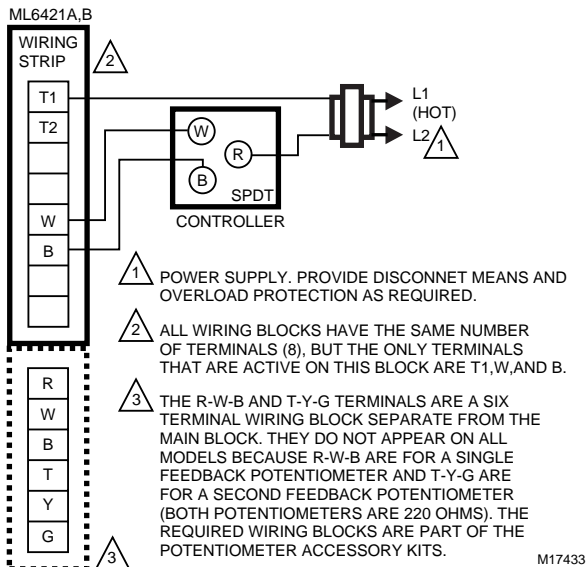


Fig. 5. ML6421 typical wiring diagram.

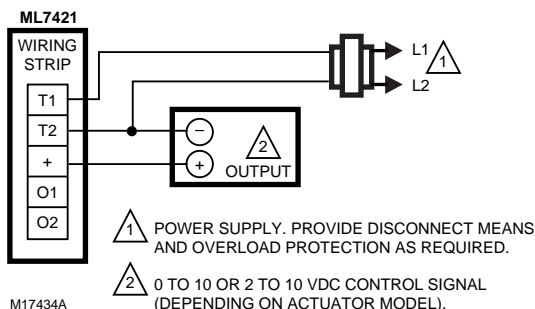


Fig. 6. ML7421 typical wiring diagram.

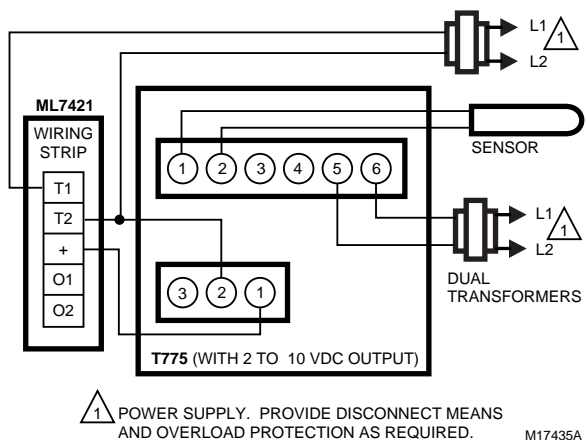


Fig. 7. ML7421 wiring using voltage input control and separate transformers.

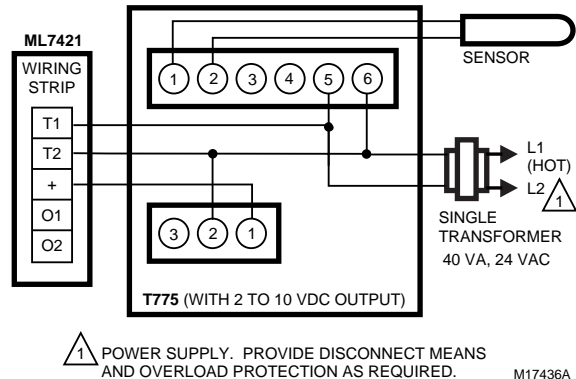


Fig. 8. ML7421 wiring using voltage input control and a common transformer.

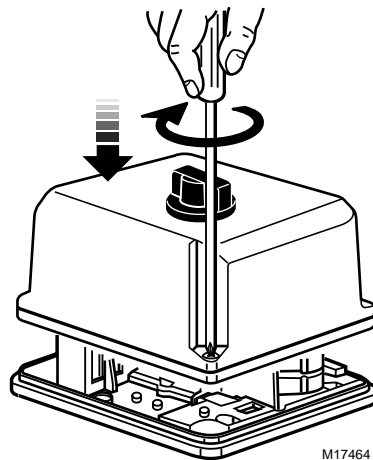


Fig. 9. Replacing actuator cover.

### Auxiliary Potentiometers

The 43191679 Auxiliary Potentiometers can be used as feedback potentiometers and to provide remote indication of the valve position. See the Accessories section for part numbers. See Installation Instructions packed with the potentiometers for details.

### Auxiliary Switches

The 43191680 Dual Auxiliary Switch can be used on both the ML6421 and ML7421 Electric Linear Valve Actuators. Switching points are adjustable over the full actuator stroke. For example, the switch can be used to switch pumps or to provide remote indication of any stroke position. See the Installation Instructions packed with the auxiliary switch for details.

### IMPORTANT

Use the 43191680 Dual Auxiliary Switch only with 24 Vac applications.

## OPERATION

### General

The drive of the actuator synchronous motor is converted into the linear motion of the actuator stem by using a worm gear transmission. A button retainer clip connects the actuator stem to the valve stem.

The internal force sensor, using installed microswitches, turns off the actuator when the specified stem force is reached.

### Manual Operation

The ML6421 and ML7421 are equipped with a manual operator knob (see Fig. 10) to open or close the valve in the event of power failure:

1. Turn off or disconnect the power supply before manually operating the actuator.
2. Push down on the manual operator knob and turn the knob:
  - a. Counterclockwise to drive the stem downward.
  - b. Clockwise to draw the stem upward.

### IMPORTANT

*Manual operation allows very high closing force that can jam the actuator spindle, exceed the force switch ratings, and stop the motor. After a manual valve close-off operation, release the spindle one turn by turning the manual operator knob. This will ensure automatic disengagement of the manual operator upon power resumption.*

NOTE: If the manual operator knob is not pushed in while turned, it will rotate only a short distance before disengaging without power resumption.

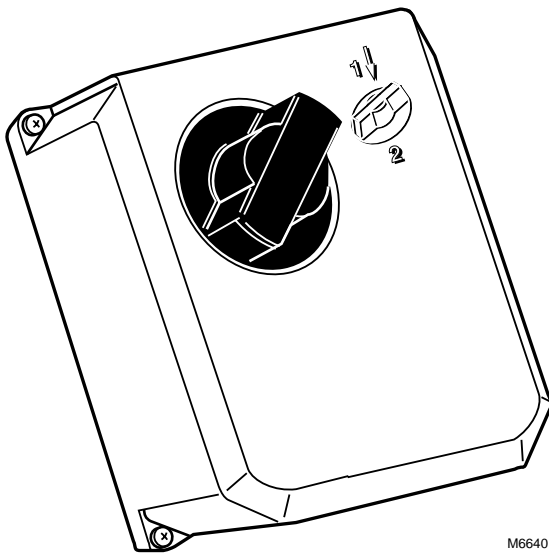


Fig. 10. Manual operator knob.

### ML7421

#### Signal Input Failure

Using selector plug W1, the actuator can be set to run to one of three positions in event of a signal failure:

- 0%: Actuator position corresponds with 0 or 2 Vdc signal.
- 50%: Actuator stem in mid-position.
- 100%: Actuator position according to 10 Vdc signal.

NOTE: If W4 is set to the mA position, the actuator always runs to 0 percent.

#### Output Signal Feedback (F)

An analog output signal (2 to 10 Vdc) that represents the actual actuator stem position is available at Terminal F. It can be used for remote indication of the stem position.

With the actuator stem fully down, the output signal is 10 Vdc. The output of the signal does not change when the actuator action reverses using W3 or W4 (see Signal Input Failure section and Fig. 11).

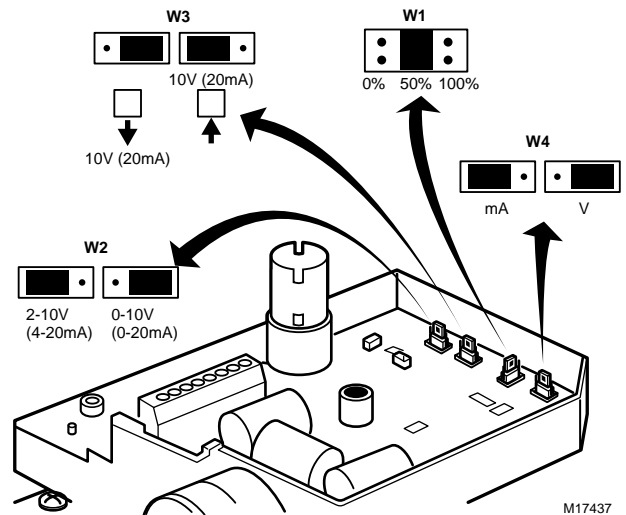


Fig. 11. Location of selector plugs.

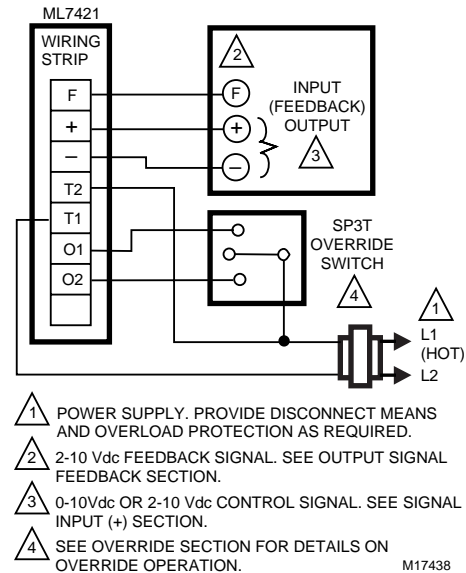
## Actuator Override

To override the control signal (for freeze protection or similar applications), connect the 24 Vac common (T2) to either terminal O1 or O2. Connecting to terminal O1 fully extends the actuator stem. Connecting to O2 fully retracts the actuator stem.

The control signal (+) is ignored when the override signal is applied to terminal O1 or O2. This override can be achieved with a switch or a relay. See Fig. 12.

## Direction of Action

The direction of action can be changed by repositioning the selector plug W3.



**Fig. 12. Connections for overriding control signal to drive actuator to a specific position.**

## CHECKOUT

The actuator can be checked out either directly or using a controller.

### Direct Checkout

1. Mount the actuator for the required application.
2. Check the valve position and make sure that 24 Vac is correctly applied to the actuator.
3. Apply the control signal to the appropriate leadwires to move the valve in the required direction.
4. If the actuator does not move, make sure the actuator is properly installed.
5. If the actuator is correctly installed and does not run, replace the actuator.

### Controller Checkout

1. Adjust the setpoint of the controller to call for opening or closing the valve. Observe the actuator.
2. If the valve is closed, it should begin to open.
3. If the valve remains closed, move the setpoint further toward the open setting.
4. If the valve does not move, check for 24 Vac in the actuator power input.
5. If 24 Vac is present and the actuator does not operate, reverse the controller leadwires to determine if the device is incorrectly wired.
6. If wiring is correct, 24 Vac is present on the power input terminals, and the actuator does not run, replace the actuator.

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