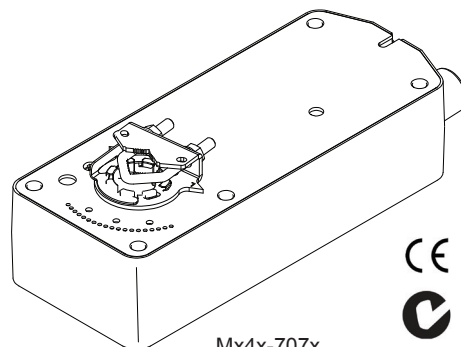


SmartX Actuators 60 and 133 lb-in. Spring Return Mounting and Wiring Instructions

Requirements

- Job wiring diagrams
- Tools and hardware (not provided):
 - #8 sheet metal screws (for universal bracket)
 - 10 mm open end wrench or socket wrench (universal V-clamp)
 - 1/8 inch, allen wrench (aux. switch)
 - Appropriate screwdriver(s)
 - Drill and appropriate bits
- Appropriate accessories
- Training: Installer must be a qualified, experienced technician



Mx4x-707x
Mx4x-715x
Mx4x-707x-502
Mx4x-715x-502

Additional Information

F-Number	Description
F-26642	MA40-704x, MA4x-707x, and MA4x-715x Series SmartX Spring Return Two-Position Actuators General Instructions
F-26644	MF4x-7153 and MF4x-70x3 Series SmartX Spring Return Floating Actuators General Instructions
F-26645	MS40-7043, MS4x-7073, and MS4x-7153 Series SmartX Spring Return Proportional Actuators General Instructions

Precautions



- Electrical shock hazard! Disconnect the power supply (line power) before installation to prevent electric shock and equipment damage.
- Make all connections in accordance with the job wiring diagram and in accordance with national and local electrical codes. *Use copper conductors only.*

Caution: Do not drill holes in the actuator body. Six pre-drilled holes are located on each side, under the label, to accept #10-24 thread-forming screws for mounting accessories (Figure-2).

Mx40-707x-502 and Mx40-715x-502 units manufactured prior to the date code 0141 (October 6, 2001) used different color coding for the auxiliary switches (see Typical Applications Wiring Diagrams).

Caution: Do not drill holes in the actuator body. Six pre-drilled holes are located on each side, under the label, to accept #10-24 thread-forming screws for mounting accessories (Figure-2).

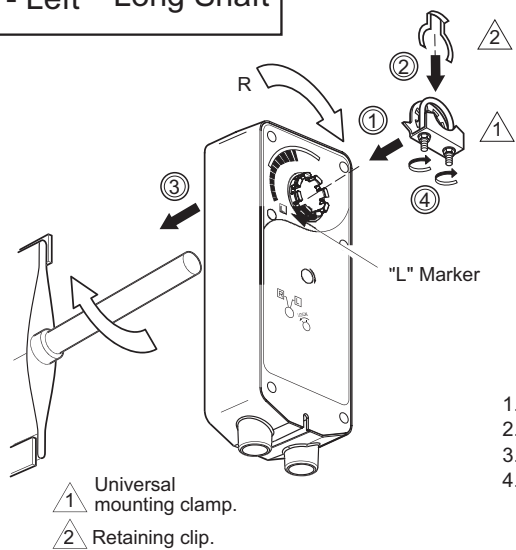
Note: The Mx4x-707x and Mx4x-715x series actuators come equipped with a standard universal mounting clamp installed. For damper shafts larger than 3/4" (19 mm) diameter, the AM-687 universal mounting clamp is required (order separately). The AM-687 clamp accommodates round shafts of up to 1-1/16" (27 mm) diameter and square shafts of up to 5/8" (16 mm) square.

Caution: The Mx41-707x and Mx41-715x actuators are equipped with a manual override.

- The manual override to be used only when power is not applied to the unit.
- If the universal clamp is not set to 0° on the position indicator, manually wind the actuator in the direction indicated with hex wrench from -5° to 0° and lock with a screwdriver.
- When operating manual override, back off 5° from full open mechanical stop to ensure proper release.
- Do not attempt to use the manual override with actuators mounted in tandem. Damage to the gear train could occur.
- Using power tools to adjust the manual override will cause damage to the gears.
- To unlock manual override without power, crank the manual override in the direction indicated a minimum of 5°.

<p>Long Shaft</p>	<p>Min. 3 1/2" (90 mm)</p>	<p>Short Shaft</p>	<p>Min. 3/4" (20 mm)</p>
<p>3/8" to 3/4" Diameter (10 mm to 20 mm) 3/8" to 1/2" Square (10 mm to 13 mm)</p>			
<p>Move the damper to its normal position. Verify the controller action is set to match the damper application.</p> <p>Normally closed damper: when damper is closed, actuator position indicator should be at 0°. When damper is open, actuator position indicator should be at 90°.</p> <p>Normally opened damper: when damper is open, actuator position indicator should be at 0°. When damper is closed actuator position indicator should be at 90°.</p>			
<p>A - Left</p>	<p>Shaft Rotates Clockwise To Open</p>	<p>A - Right</p>	<p>Shaft Rotates Counterclockwise To Open</p>
<p>This step determines shaft rotation. Linkage may change damper direction.</p>			
<p>B</p>	<p>For MF41-707X and MF41-715X only (manual override). For MF40-707X and MF40-715X, proceed to step C.</p> <p>If position indicator does not point to zero: Unlock the actuator. Insert hex wrench into manual override. Crank the actuator so the indicator points to 0°. Lock the actuator.</p>		
<p>Fully engage hex wrench into manual override before winding.</p> <p>Caution: Do not crank the manual override if power is applied to the actuator.</p>	<p>Manual Override</p> <p>Unlock</p>		

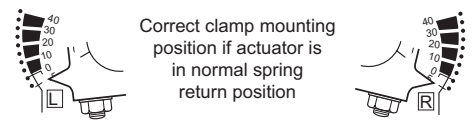
C - Left - Long Shaft



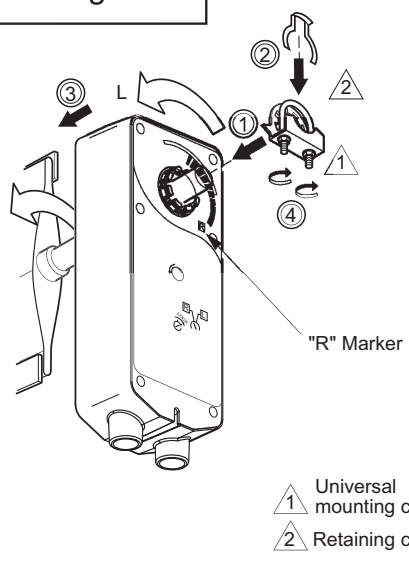
1. Assemble mounting clamp.
2. Assemble retaining clip.
3. Place actuator over shaft.
4. Hand tighten clamp nuts.

- ① Universal mounting clamp.
- ② Retaining clip.

For MF40-707X and MF40-715X actuators:



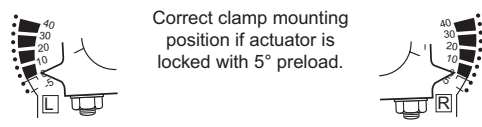
C - Right - Long Shaft



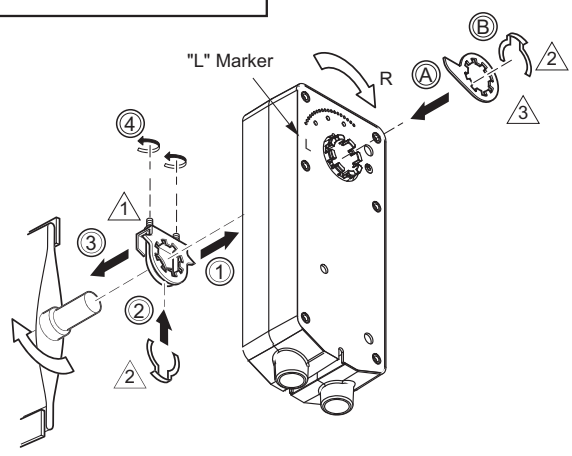
1. Assemble mounting clamp.
2. Assemble retaining clip.
3. Place actuator over shaft.
4. Hand tighten clamp nuts.

- ① Universal mounting clamp.
- ② Retaining clip.

For MF41-707X and MF41-715X actuators:



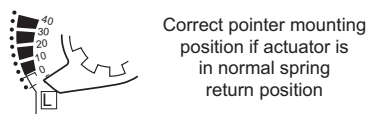
C - Left - Short Shaft



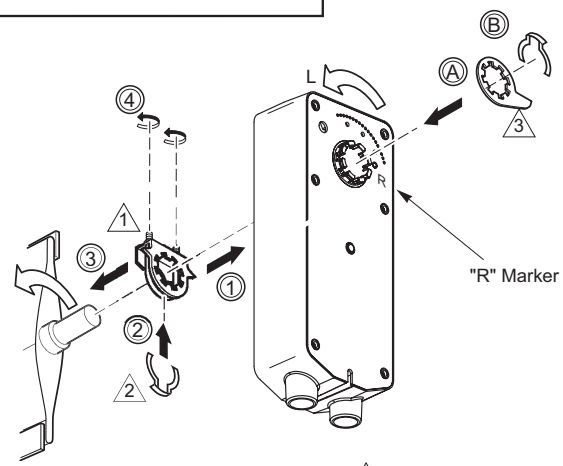
- A. Assemble damper position indicator.
 - B. Assemble retaining clip.
1. Position mounting clamp.
 2. Assemble retaining clip.
 3. Slide actuator over shaft.
 4. Hand tighten clamp nuts.

- ① Universal clamp.
- ② Retaining clip.
- ③ Damper position indicator.

For MF40-707X and MF40-715X actuators:

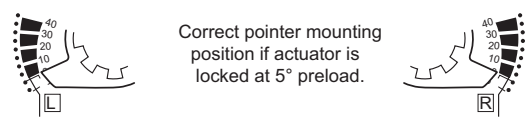


C - Right - Short Shaft



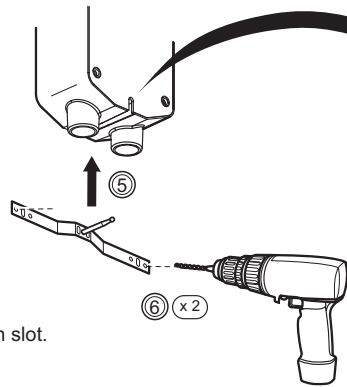
- ① Universal clamp.
- ② Retaining clip.
- ③ Damper position indicator.

For MF41-707X and MF41-715X actuators:



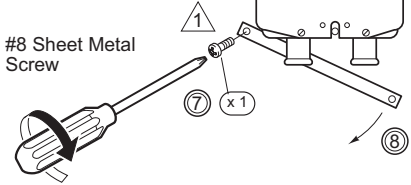
D - Left and Right

Center the
Universal Bracket in the Slot

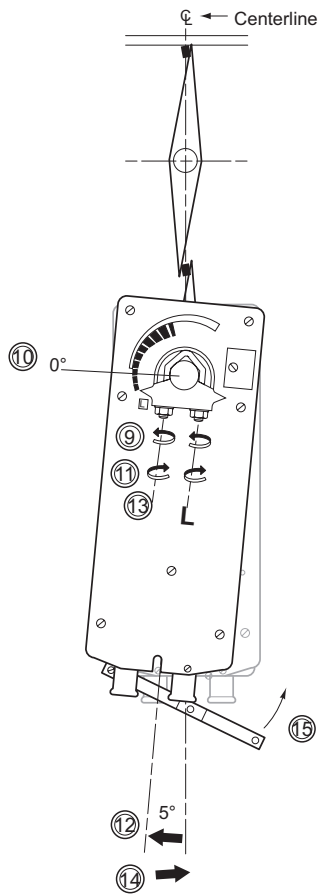


5. Center bracket in slot.
 6. Drill two holes.
 7. Start one screw.
- For MF41-707X and MF41-715X actuators, insert and tighten both screws.
8. Swing bracket down (MF40 actuator only).

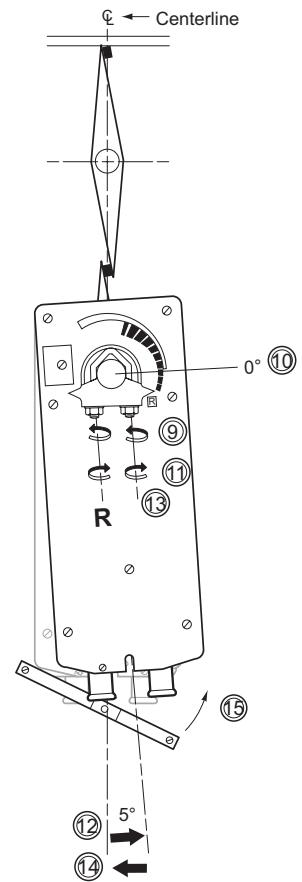
#8 Sheet Metal
Screw



E- Left



E- Right



9. Loosen clamp nuts.
10. Check that the shaft is in full zero position.

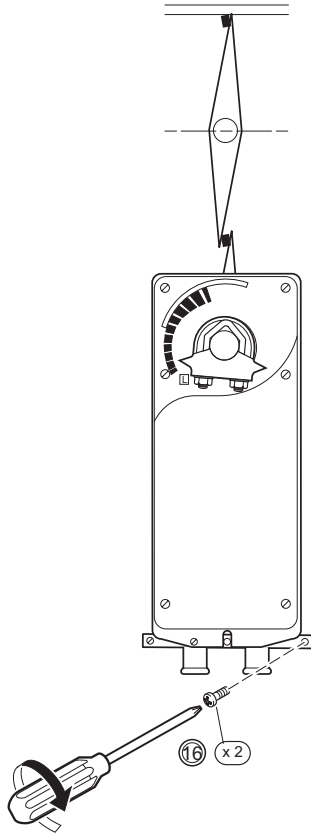
For MF41-707X and MF41-715X only:

11. Tighten clamp nuts to 8 - 10 ft-lb (11 - 14 Nm).
This completes the installation for MF41-704X
and MF41-715X.

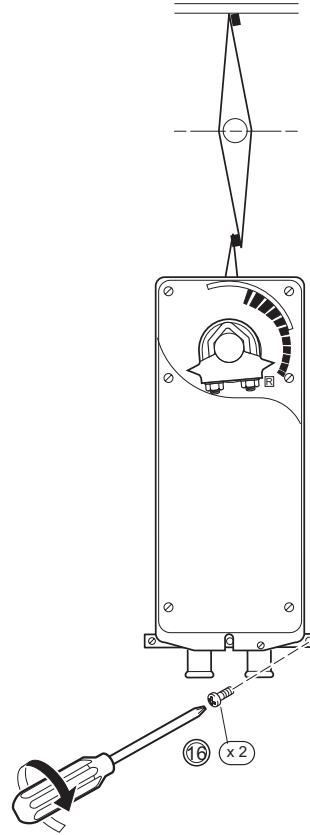
For MF40-707X and MF40-715X only:

12. Swing actuator 5° in the direction of travel. Do
not move shaft.
13. Tighten clamp nuts to 8 - 10 ft-lb (11 - 14 Nm).
14. Move bottom of actuator back into position.
15. Pivot bracket back into position.

F- Left

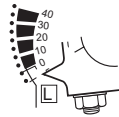


F- Right



For MF40-707X and MF40-715X only:
16. Tighten bracket screws.

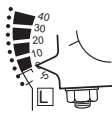
For MF40-707X and MF40-715X actuators:



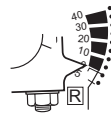
Correct pointer position after mounting.



For MF41-707X and MF41-715X actuators:



Correct pointer position after mounting.



The lock on MF41-707X and MF41-715X will release on first power-up.

Note: Limiting the rotation of the actuator also reduces the system throttling range. Be sure to adjust the controller's throttling range accordingly.

The AM-689 rotation limiter is used in conjunction with the tab on the universal clamp or the AM-686 position indicator which comes with the AM-689. In order to function properly, the clamp or indicator must be mounted correctly.

The AM-689 rotation limiter controls the rotational output of the Mx4x-707x, Mx4x-707x-502, Mx4x-715x, and Mx4x-715x-502 actuators. It is used in applications where a damper has a designed rotation that is less than 90°, for example with a 45° or 60° rotating damper. It can also be used to provide a minimum damper position which is easily set, or changed, without removing the actuator from the damper.

1. Determine the amount of damper rotation required.
2. Locate the AM-689 rotation limiter on the actuator so that its edge lines up with the degree graduation on the actuator face which corresponds with the required rotation. See (Figure-1).
3. Find the appropriate cross hair location through the slot of the rotation limiter. This is the mounting location for the retaining screw.
4. Pierce through the label material to allow easy fastening of the retaining screw.
5. Position the rotation limiter back to the desired position, making sure the locating "teeth" on the rotation limiter are engaged into the locating holes on the actuator.
6. Fasten the rotation limiter to the actuator using the self-tapping screw provided.
7. Test the damper rotation by applying power and the required control signal. Readjust if necessary.

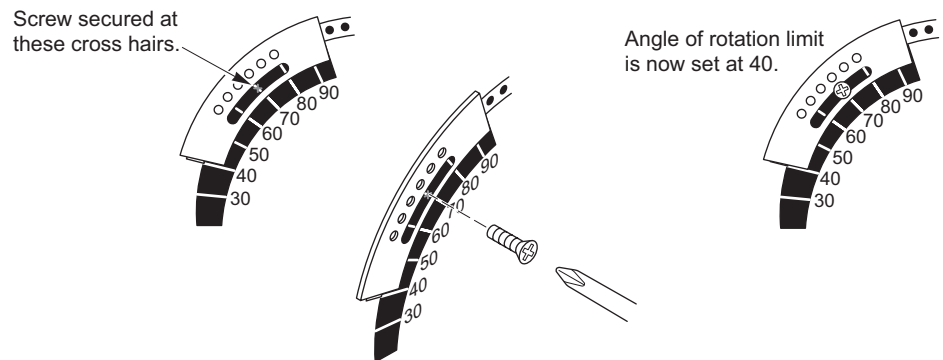


Figure-1 Securing the AM-689 Rotation Limiter.

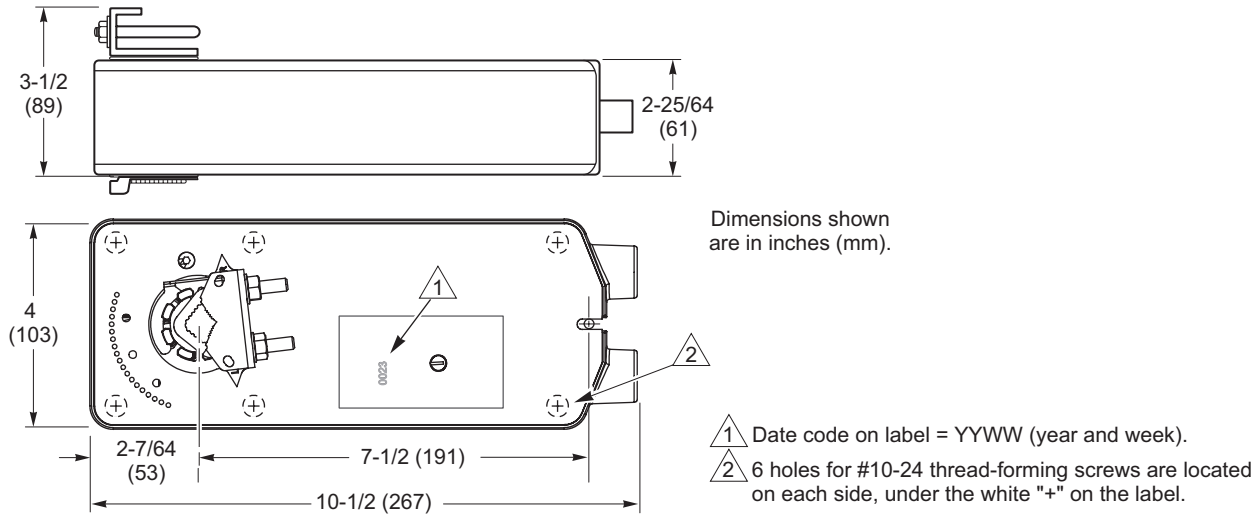


Figure-2 Mx4x-707x and Mx4x-715x Series Mounting Dimensions.

Mx40-707x-502 and Mx40-715x-502 units manufactured prior to the date code 0141 (October 6, 2001) used different color coding for the auxiliary switches.

Auxiliary Switch 1

- Orange: Fixed auxiliary switch common (com)
- Yellow: Fixed auxiliary switch normally closed (NC)
- Violet: Fixed auxiliary switch normally open (NO)

Auxiliary Switch 2

- Orange/white: Adjustable auxiliary switch common (com)
- Violet/white: Adjustable auxiliary switch normally closed (NC)
- Yellow/white: Adjustable auxiliary switch normally open (NO)

The label information on these units is incorrect. If replacing these units, the auxiliary switch operation of the replacement actuator will be per the product label and Figure-3.

MA4x-707x-xxx and MA4x-715x-xxx

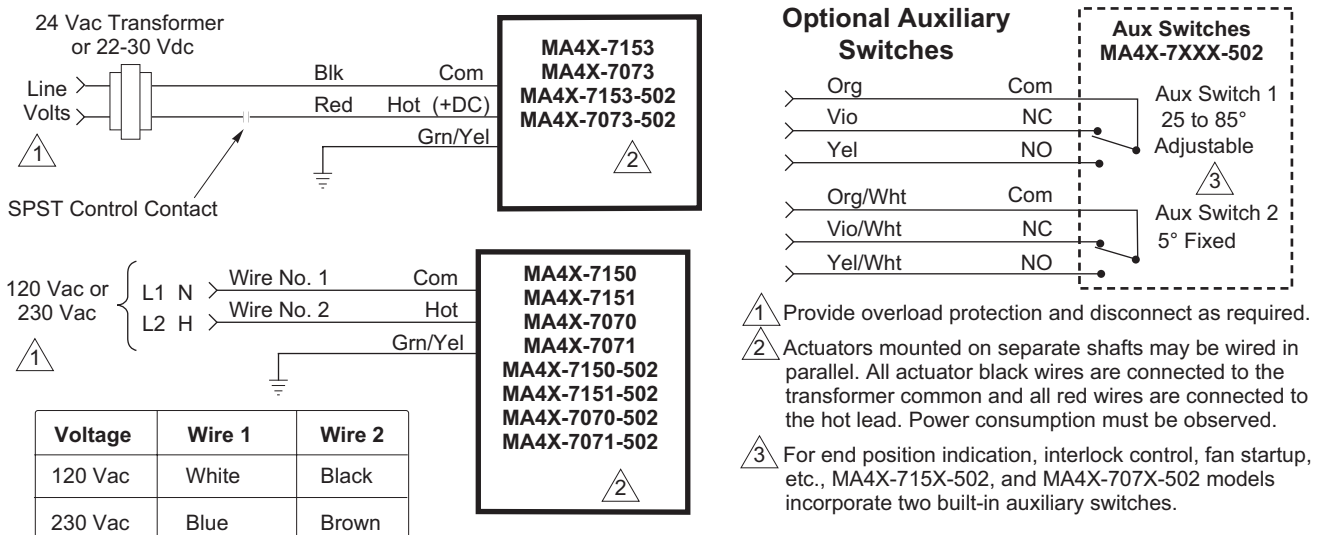


Figure-3 Typical Wiring Diagram for Two-Position Basic and Double Auxiliary Switch Models.

MF4x-7073-xxx and MF4x-7153-xxx

Caution: This product contains a half-wave rectifier power supply. It must not be powered with transformers that are used to power other devices utilizing non-isolated full-wave rectifier power supplies. Refer to *EN-206, Guidelines for Powering Multiple Devices from a Common Transformer, F-26363* for detailed information.

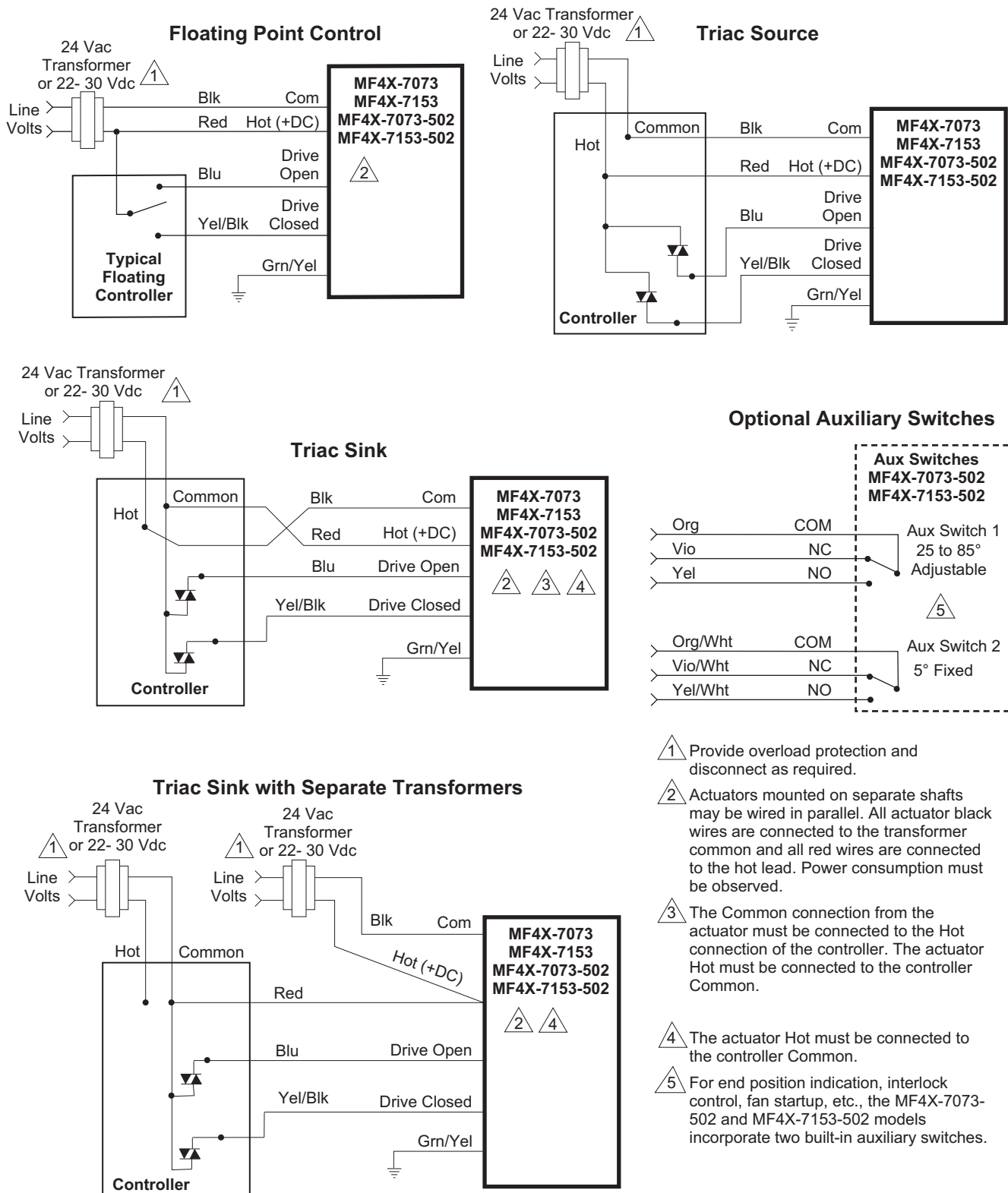
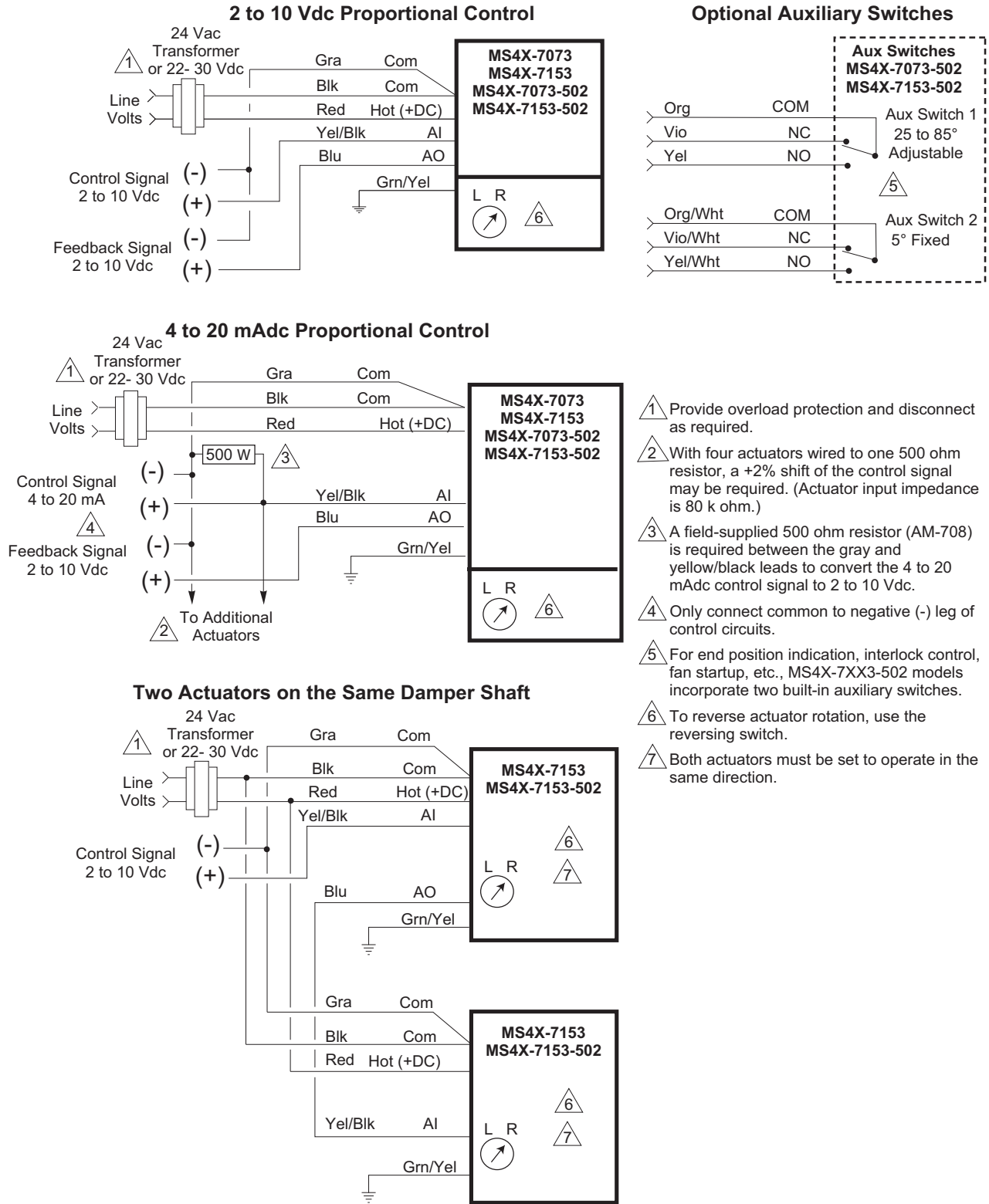


Figure-4 Typical Wiring Diagrams for Floating Control 24 Vac Basic and Double Auxiliary Switch Models.

- 1 Provide overload protection and disconnect as required.
- 2 Actuators mounted on separate shafts may be wired in parallel. All actuator black wires are connected to the transformer common and all red wires are connected to the hot lead. Power consumption must be observed.
- 3 The Common connection from the actuator must be connected to the Hot connection of the controller. The actuator Hot must be connected to the controller Common.
- 4 The actuator Hot must be connected to the controller Common.
- 5 For end position indication, interlock control, fan startup, etc., the MF4X-7073-502 and MF4X-7153-502 models incorporate two built-in auxiliary switches.

MS4x-7073-xxx and MS4x-7153-xxx

Caution: This product contains a half-wave rectifier power supply. It must not be powered with transformers that are used to power other devices utilizing non-isolated full-wave rectifier power supplies. Refer to *EN-206, Guidelines for Powering Multiple Devices from a Common Transformer, F-26363* for detailed information.



- 1 Provide overload protection and disconnect as required.
- 2 With four actuators wired to one 500 ohm resistor, a +2% shift of the control signal may be required. (Actuator input impedance is 80 k ohm.)
- 3 A field-supplied 500 ohm resistor (AM-708) is required between the gray and yellow/black leads to convert the 4 to 20 mAdc control signal to 2 to 10 Vdc.
- 4 Only connect common to negative (-) leg of control circuits.
- 5 For end position indication, interlock control, fan startup, etc., MS4X-7XX3-502 models incorporate two built-in auxiliary switches.
- 6 To reverse actuator rotation, use the reversing switch.
- 7 Both actuators must be set to operate in the same direction.

Figure-5 Typical Wiring Diagrams for Proportional Control 24 Vac Basic and Double Auxiliary Switch Models.

