

Mounting Installation Instructions

LM, NM, AM, GM



Please refer to the appropriate product literature for detailed installation information.

Reference

- Mounting Methods Guide
- Wiring Guide
- Damper Application Guide

Auxiliary Switches

The ...S model actuators are equipped with an adjustable auxiliary switch used to indicate damper position or to interface additional controls or equipment. Switching positions can be set over the full 0 to 95° rotation simply by setting a switch on the actuator.

S2	S3	S2	S3	Switch Rating
				Voltage 250 VAC
				Resistive load 3 A
				Inductive load 0.5 A

General Information

Preliminary steps

1. Belimo actuators with NEMA 1 or NEMA 2 ratings should be mounted indoors in a dry, relatively clean environment free from corrosive fumes. If the actuator is mounted outdoors, a protective enclosure must be used to shield the actuator.
2. For new construction work, **order dampers with extended shafts**. Instruct the installing contractor to allow space for mounting the Belimo actuator on the shaft.

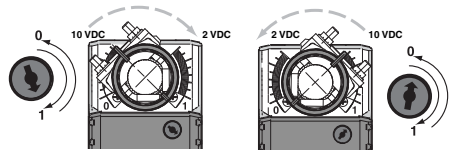
For replacement of existing gear train actuators, there are two options:

- A. From a performance standpoint, it is best to mount the actuator directly onto the damper shaft.
- B. If the damper shaft is not accessible, mount the non-spring return actuator with a ZG-NMA or ZG-GMA crankarm kit, and a mounting bracket (ZG-100, ZG-101, ZG-103, ZG-104).

Direction of Rotation Switch

Non-spring return actuators have a reversing switch on the cover. Switch position indicates start point. For the non-spring return, with the switch in position 1, the actuator rotates clockwise with a decrease in voltage or current. With the switch in position 0, the actuator rotates counterclockwise with a decrease in voltage or current.

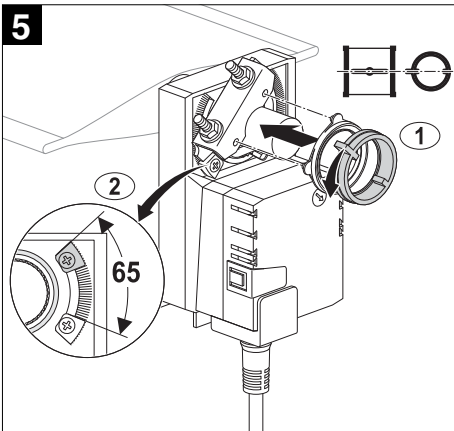
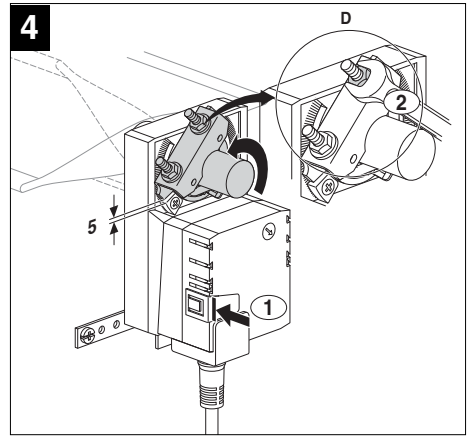
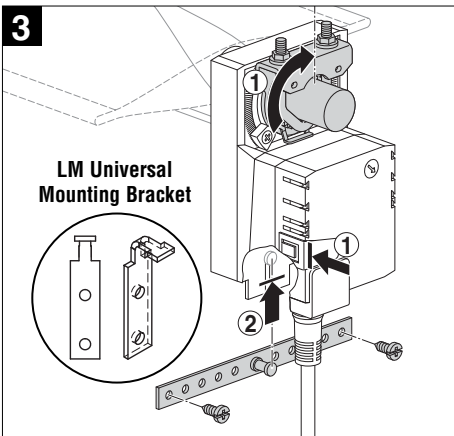
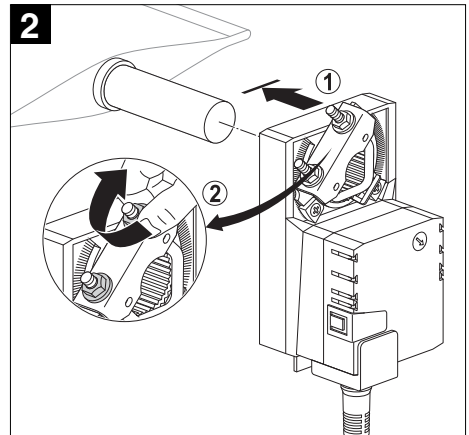
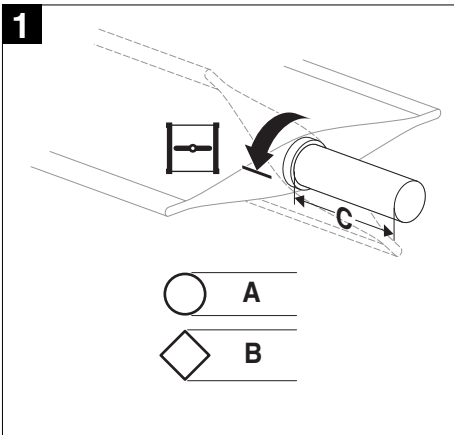
The non-spring return rotates clockwise when the switch is in the 1 position and power is applied to wire #2. When power is applied to wire #3 the actuator rotates counter clockwise. Rotating the switch to 0 reverses the control logic.



During checkout, the switch position can be temporarily reversed and the actuator will reverse its direction. This allows the technician a fast and easy way to check the actuator operation without having to switch wires or change settings on the thermostat. When the check-out is complete, make sure the switch is placed back to its original position.

Installation Instructions

Quick-Mount Visual Instruction for Mechanical Installation

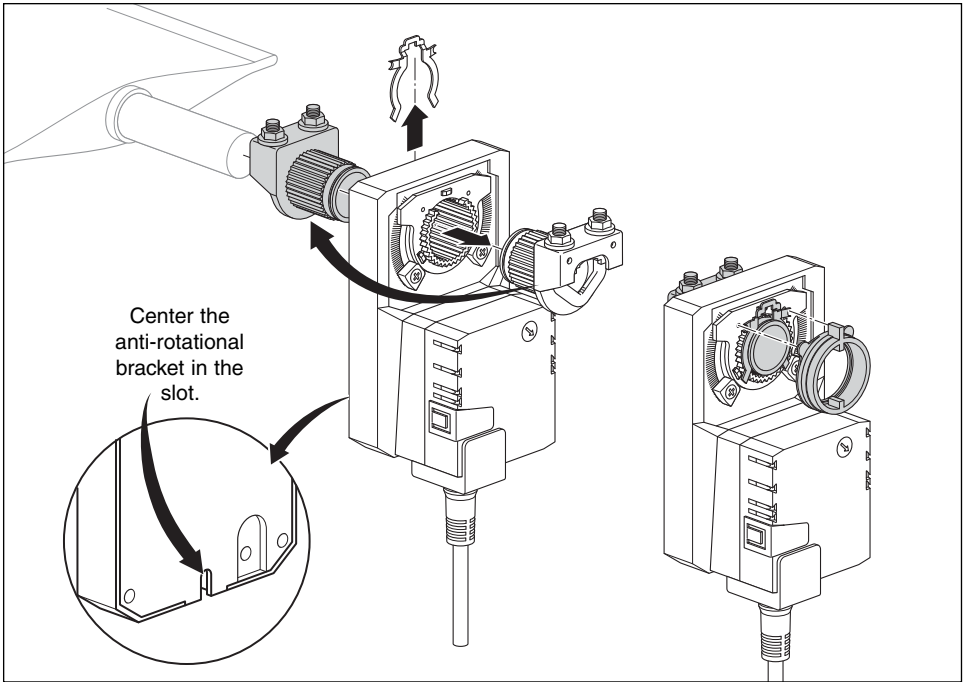


See next page for standard mounting instructions.

	A*	B	C**	D
LMB	1/4" to 5/8"	5/16" to 9/16"	1.5"	4 to 5 ft-lb
LMQB	1/2" to 1.05"	3/8" to 11/16"	1.5"	6 to 7 ft-lb
NMB	1/2" to 1.05"	3/8" to 11/16"	1.5"	6 to 7 ft-lb
NMQB	1/2" to 1.05"	3/8" to 11/16"	1.5"	6 to 7 ft-lb
AMB	1/2" to 1.05"	3/8" to 11/16"	1.5"	6 to 7 ft-lb
AMQB	1/2" to 1.05"	7/16" to 11/16"	1.5"	6 to 7 ft-lb
GMB	1/2" to 1.05"	7/16" to 11/16"	1.5"	6 to 7 ft-lb

*LMB standard clamp has max 5/8" diameter. Accessory clamp K-LM20 can be mounted for sizes up to 3/4" diameter. NM and AM clamps have an insert that self-centers on the following diameter shafts: 1/2" (default), 3/4" and 1.05". GM clamps have an insert that self-centers on 3/4" diameter.

**Shorter with reversible clamp for NMB, AMB, and GMB



Standard Mounting

1. Turn the damper shaft until the blades are fully closed.
 2. ① Slip the actuator's universal clamp over the damper shaft. Make sure that the duct and the controls on the cover are accessible. Place the actuator in the desired mounting position.
 ② Hand tighten the two nuts on the actuators universal clamp.
 3. ① Disengage the actuator gear train by pressing the manual override button and rotate the clamp until centered.
 ② Slide the anti-rotation strap up under the actuator so it engages the actuator at the **center of the cutout**. Bend the bracket as needed to support the rear of the actuator. Secure to ductwork with self-tapping screws (No. 8 recommended).
 4. ① Loosen the nuts on the universal clamp. Press the manual override button and rotate the clamp to about 5° from the closed position (1/16 to 1/8" between stop and clamp).
 ② Tighten the two nuts on the universal clamp with a 8, 10 or 12mm wrench (see table, column D on page 2 for required torque).
 5. ① Snap on the reflective position indicator.
 ② Adjust end-stops, if required
 6. Mount actuators indoors. If mounted outdoors, use approved protective enclosure. The damper is now fully closed but the actuator is 5° from fully closed. This is called "pre-loading" the actuator. When the actuator is powered and sent to the closed position: it will put its full torque on the shaft compressing the edge and blade seals. This ensures that the damper will meet its leakage rating. The actuator is electronically protected from overload and will not be damaged.
- Testing the installation without power**
1. Disengage the gear train with the manual override button and move the shaft from closed to open to closed. Ensure that there is no binding and that the damper goes fully open and closes with 5° of actuator stroke left.
 2. Correct any problems and retest.

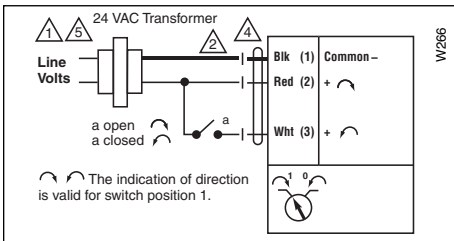
Wiring

On/Off, Floating Point

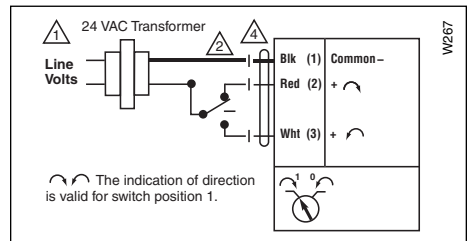


Airside Products	Torque (based on 4 in-lb per sq. ft)						Running Time	Power Supply		Power Consumption		Feedback	
	35 in-lb [4 Nm], Approx. 11 sq. ft.	45 in-lb [5 Nm], Approx. 11 sq. ft.	70 in-lb [8 Nm], Approx. 22 sq. ft.	90 in-lb [10 Nm], Approx. 22 sq. ft.	140 in-lb [15 Nm] Approx. 45 sq. ft.	180 in-lb [20 Nm], Approx. 45 sq. ft.		360 in-lb [40 Nm], Approx. 90 sq. ft.	24 VAC +/- 20%, VDC +/- 15%	100 to 240 VAC	VA rating	Wattage running (holding)	5 kΩ Resistive
GMB24-3							●			6	4 (2.0)		
GMX24-3							●			6	4 (2.0)		
GMX120-3							●		●	7	4 (2.0)		
AMB24-3								●		5.5	2.5 (0.2)		
AMB24-3-S								●		5.5	2.5 (0.2)		
AMX24-3								●		5.5	2.5 (0.2)		
AMX24-3-T								●		5.5	2.5 (0.2)		
AMX120-3								●	●	7	3 (0.6)		
AMQB24-1					●			●		18	12 (1.5)		
AMQX24-1					●			●		18	12 (1.5)		
NMB24-3				●				●		4	2 (0.2)		
NMX24-3				●				●		4	2 (0.2)		
NMX24-3-T				●				●		4	2 (0.2)		
NMX120-3				●				●	●	7	3 (0.6)		
NMQB24-1			●					●		18	12 (1.5)		
NMQX24-1			●					●		18	12 (1.5)		
LMB24-3	●							●		2	1.5 (0.2)		
LMB24-3.1	●							●		2	1.5 (0.2)		
LMB24-3-S	●							●		2	1.5 (0.2)		
LMB24-3-T	●							●		2	1.5 (0.2)		
LMB24-3-T.1	●							●		2	1.5 (0.2)		
LMB24-3-P5-T	●							●		2	1.5 (0.2)	●	
LMX24-3-P5-T.1	●							●		2	1.5 (0.2)	●	
LMX24-3-P10-T	●							●		2	1.5 (0.2)		●
LMX24-3	●							●		2	1.5 (0.2)		
LMX24-3-T	●							●		2	1.5 (0.2)		
LMX120-3	●							●	●	4	2 (0.5)		
LMQB24-1	●							●		18	12 (1.5)		
LMQX24-1	●							●		18	12 (1.5)		

Wiring



On/Off

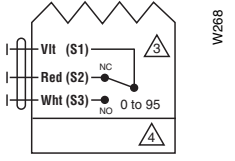


Floating Point or On/Off control

Notes:

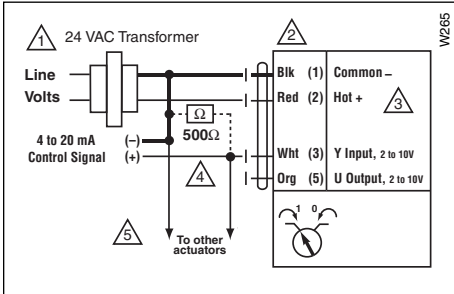
- 1 Provide overload protection and disconnect as required.
- 2 Actuators may also be powered by 24 VDC for a 24V power supply.
- 3 For end position indication, interlock control, fan startup, etc., xMB24-3-S incorporates one built-in auxiliary switches: 1 x SPDT, 3A (0.5A) @250 VAC, UL listed, adjustable 0° to 95°.
- 4 Meets cULus requirements without the need of an electrical ground connection.
- 5 For 100 to 240 VAC no transformer is required.

Auxiliary Switch of LMB24-3-S and AMB24-3-S



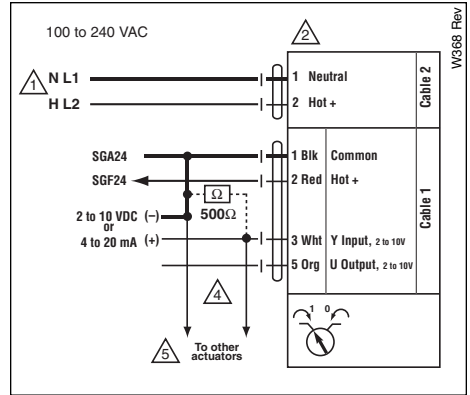
Airside Products	Torque (based on 4 in-lb per sq. ft)				Running Time	Power Supply		Power Consumption		Feedback
	45 in-lb [5 Nm], Approx. 11 sq. ft.	90 in-lb [10 Nm], Approx. 22 sq. ft.	180 in-lb [20 Nm], Approx. 45 sq. ft.	360 in-lb [40 Nm], Approx. 90 sq. ft.		Motor Drive (Default)	24 VAC +/- 20%, VDC +/- 15%	100 to 240 VAC	VA rating	
GMB24-SR				●	150	●		6	4 (2.0)	●
GMX24-SR				●	150	●		6	4 (2.0)	●
AMB24-SR			●		95	●		5.5	2.5 (0.2)	●
AMX24-SR			●		95	●		5.5	2.5 (0.2)	●
AMX24-SR-T			●		95	●		5.5	2.5 (0.2)	
AMX120-SR			●		95		●	7.5	4 (1.0)	●
NMB24-SR		●			95	●		4	2 (0.2)	●
NMX24-SR		●			95	●		4	2 (0.2)	●
NMX24-SR-T		●			95	●		4	2 (0.2)	
NMX120-SR		●			95		●	7	3 (0.6)	●
LMB24-SR	●				95	●		2	1.5 (0.2)	●
LMB24-SR.1	●				95	●		2	1.5 (0.2)	●
LMB24-SR-T	●				95	●		2	1.5 (0.2)	
LMB24-SR-T.1	●				95	●		2	1.5 (0.2)	
LMB24-3-P5-T	●				95	●		2	1.5 (0.2)	●
LMX24-SR	●				95	●		2	1.5 (0.2)	
LMX24-SR-T	●				95	●		2	1.5 (0.2)	
LMX120-SR	●				95		●	4	2 (0.5)	●

Wiring



Notes:

- 1 Provide overload protection and disconnect as required.
- 2 Actuators may be connected in parallel. Power consumption and input impedance must be observed.
- 3 Actuators may also be powered by 24 VDC.
- 4 The ZG-R01 500Ω resistor converts the 4 to 20 mA control signal to 2 to 10 VDC, up to 2 actuators may be connected in parallel.
- 5 Only connect common to neg. (-) leg of control circuits.

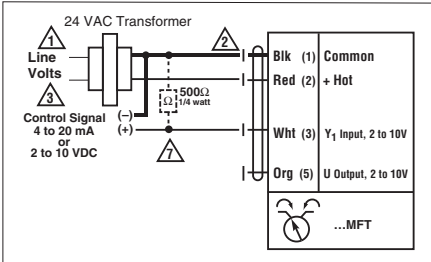


Airside Products

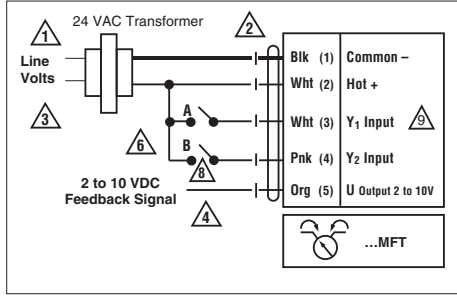
	Torque (based on 4 in-lb per sq. ft)						Running Time	Power Supply	Power Consumption		Feedback	
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GMX24-MFT						●	150	●	6.5	4.5 (2.0)	●	●
AMX24-MFT							150	●	6	4 (1.2)	●	●
AMQX-MFT					●		7	●	18	12 (1.5)	●	●
NMX24-MFT				●			150	●	5.5	3.5 (1.2)	●	●
NMQX-MFT			●				4	●	18	12 (1.5)	●	●
LMX24-MFT		●					150	●	3.5	2 (1.2)	●	●
LMQX-MFT	●						2.5	●	18	12 (1.5)	●	●

Wiring

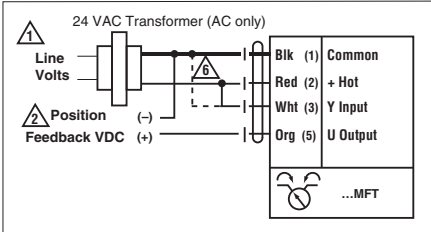
VDC/4-20 mA



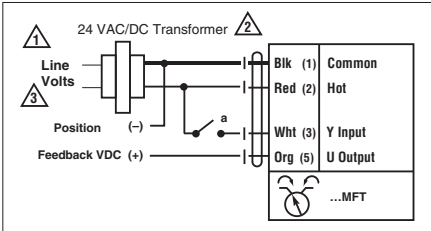
Floating Point



PWM



On/Off



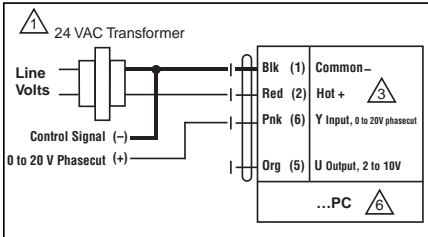
Notes:

- 1 Provide overload protection and disconnect as required.
- 2 Actuators may be connected in parallel if not mechanically mounted to the same shaft. Power consumption and input impedance must be observed.
- 3 Actuators may also be powered by 24 VDC.3
- 4 Position feedback cannot be used with a Triac sink controller. The actuator internal common reference is not compatible.
- 6 Control signal may be pulsed from either the Hot (Source) or Common (Sink) 24 VAC line.
- 7 ZG-R01 may be used.
- 8 Contact closures A & B also can be triacs. A & B should both be closed for triac source and open for triac sink.
- 9 For triac sink the common connection from the actuator must be connected to the hot connection of the controller.

W399

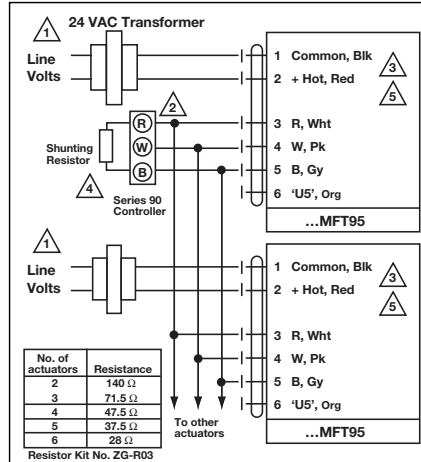
Airside Products	Torque (based on 4 in-lb per sq. ft)				Running Time	Power Supply	Power Consumption		Feedback	
	45 in-lb [5 Nm], Approx. 11 sq. ft.	90 in-lb [10 Nm], Approx. 22 sq. ft.	180 in-lb [20 Nm], Approx. 45 sq. ft.	360 in-lb [40 Nm], Approx. 90 sq. ft.			VA rating	Wattage running (holding)	2 to 10 VDC (Default)	VDC Variable (0 to 10 VDC)
GMX24-MFT95				●	150	●	6.5	4.5 (2.0)	●	●
AMX24-MFT95			●		150	●	6	4 (1.25)	●	●
NMX24-MFT95		●			150	●	5.5	3.5 (1.25)	●	●
LMX24-MFT95	●				150	●	3.5	2 (1.2)	●	●
GMX24-PC				●	150	●	6.5	4.5 (2.0)	●	
AMX24-PC			●		150	●	6	4 (1.25)	●	
NMX24-PC		●			150	●	5.5	3.5 (1.25)	●	
LMX24-PC	●				150	●	3.5	2 (1.2)	●	

Wiring



Notes:

- 1 Provide overload protection and disconnect as required.
- 2 Actuators may be connected in parallel. Power consumption and input impedance must be observed.
- 3 Actuator may also be powered by 24 VDC.
- 3 Actuators and controller must have separate transformers.
- 4 Consult controller instruction data for more detailed installation information.
- 5 Resistor value depends on the type of controller and the number of actuators. No resistor is used for one actuator. Honeywell resistor kits may also be used.
- 6 To reverse control rotation, use the reversing switch.



Wiring multiple actuators to a Series 90 controller.

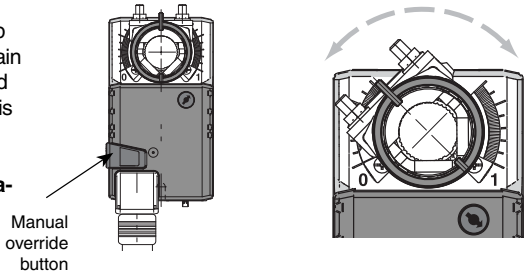
Operations

Mechanical Features



Manual Override

The Belimo non-spring return actuators have a black, "manual override button" located on the top of the housing. Press this button and the gear train is disengaged so the damper shaft can be moved manually. Release the button and the gear train is re-engaged.

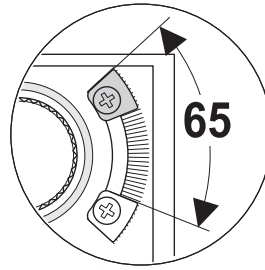


Use the manual override to test the installation without power. For tight shut-off the damper should close with 5° of actuator stroke left.

Mechanical Angle of Rotation Limiting

The adjustable stops are needed when there is no damper stop or if you want the damper to stop rotating before it reaches its stops. The non-spring return actuators can be indefinitely stalled in any position without harm.

1. Loosen the two end stops with a No. 2 Phillips head screwdriver being careful not to unscrew the captive nut under the slot.
2. Move the stops (in 2.5° steps) to the desired position and re-tighten the screws.



Z-SMA for replacing AM and SM actuators
Z-GMA for replacing GM actuators

