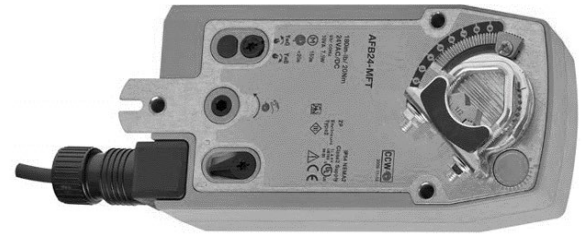


AFB24-MFT Failsafe Multi-function Damper Actuators

Basic Fail-Safe multifunction technology actuator for controlling dampers in typical commercial HVAC applications.



Product Features

- Torque motor 180 in-lb [20 Nm]
- Nominal voltage AC/DC 24 V
- Control MFT/programmable
- Position feedback 2...10 V

Electrical data		Product data
Nominal voltage	AC/DC 24 V	Default/Configuration Default parameters for 2 to 10 VDC applications of the AF...MFT actuator are assigned during manufacturing. The parameters are variable and can be changed by three means: Factory pre-set or custom configuration, set by the customer using Act Net driver properties software or the handheld ZTH US Tool.
Nominal voltage frequency	50/60 Hz	
Nominal voltage range	AC 19.2...28.8 V / DC 21.6 V	
Power consumption in operation	7.5 W	
Power consumption in rest position	3 W	
Transformer sizing	10 VA	
Electrical Connection	18 GA appliance cable, 1 m, with 1/2" conduit connector	
Overload Protection	electronic throughout 0...95° rotation	
Electrical Protection	actuators are double insulated	
Functional data		Application For fail-safe, modulating control of dampers in HVAC systems. Actuator sizing should be done in accordance with the damper manufacturer's specifications. A feedback signal is provided for position indication for primary and secondary applications. Two AF's can be piggybacked for torque loads to max. 360 in-lb. Minimum 3/4" diameter shaft. OR Maximum of three AF's can be piggybacked for torque loads to max. 432 in-lb. Minimum 3/4" diameter shaft. Primary and secondary wiring for either configuration. Actuators must be mechanically linked.
Torque motor	180 in-lb [20 Nm]	
Operating range Y	2...10 V	
Operating range Y note	4...20 mA w/ ZG-R01 (500 Ω, 1/4 W resistor)	
Input impedance	100 kΩ for 2...10 V (0.1 mA), 500 Ω for 4...20 mA, 1500 Ω for PWM, On/Off and Floating point	
Operating range Y variable	Start point 0.5...30 V End point 2.5...32 V	
Operating modes optional	variable (VDC, on/off, floating point)	
Position feedback U	2...10 V	
Position feedback U note	Max. 0.5 mA	
Position feedback U variable	VDC variable	Operation The AF...24-MFT actuator provides 95° of rotation and is provided with a graduated position indicator showing 0° to 95°. The actuator will synchronize the 0° mechanical stop or the physical damper or valve mechanical stop and use this point for its zero position during normal control operations. A unique manual override allows the setting of any actuator position within its 95° of rotation with no power applied. This mechanism can be released physically by the use of a crank supplied with the actuator. When power is applied the manual override is released and the actuator drives toward the fail-safe position. The actuator uses a brushless DC motor which is controlled by an Application Specific Integrated Circuit (ASIC) and a microprocessor. The microprocessor provides the intelligence to the ASIC to provide a constant rotation rate and to know the actuators' exact position.
Direction of motion motor	selectable with switch 0/1	

Direction of motion fail-safe	reversible with cw/ccw mounting
Manual override	5 mm hex crank (3/16" Allen), supplied
Angle of rotation	95°
Angle of rotation note	adjustable with mechanical end stop, 35...95°
Running Time (Motor)	150 s / 90°
Running time motor variable	70...220 s
Running time fail-safe	<20 s @ -4...122°F [-20...50°C], <60 s @ -22°F [-30°C]
Adaptation Setting Range	off (default)
Override control	MIN (minimum position) = 0% MID (intermediate position) = 50% MAX (maximum position) = 100%
Noise level, motor	40 dB(A)
Noise level, fail-safe	62 dB(A)
Position indication	Mechanical
Weight	4.1 lb [1.9 kg]
Housing material	Galvanized steel and plastic housing

Safety data

Power source UL	Class 2 Supply
Degree of protection IEC/EN	IP54
Degree of protection NEMA/UL	NEMA 2
Enclosure	UL Enclosure Type 2
Agency Listing	cULus listed to UL60730-1A:02; UL 60730-2-14:02 and CAN/CSA-E60730-1:02
Quality Standard	ISO 9001
UL 2043 Compliant	Suitable for use in air plenums per Section 300.22(C) of the NEC and Section 602 of the IMC
Ambient humidity	Max. 95% RH, non-condensing
Ambient temperature	-22...122°F [-30...50°C]
Storage temperature	-40...176°F [-40...80°C]
Servicing	maintenance-free

*Variable when configured with MFT options.

†Rated Impulse Voltage 800V, Type of action 1.AA, Control Pollution Degree 3

The ASIC monitors and controls the brushless DC motor's rotation and provides a Digital Rotation Sensing (DRS) function to prevent damage to the actuator in a stall condition. The position feedback signal is generated without the need for mechanical feedback potentiometers using DRS. The actuator may be stalled anywhere in its normal rotation without the need of mechanical end switches. The AF..24-MFT is mounted directly to control shafts up to 1.05" diameter by means of its universal clamp and anti-rotation bracket. A crank arm and several mounting brackets are available for damper applications where the actuator cannot be direct coupled to the damper shaft. The spring return system provides minimum specified torque to the application during a power interruption. The AF..24- MFT actuator is shipped at 5° (5° from full fail-safe) to provide automatic compression against damper gaskets for tight shut-off.

Technical Specifications

Spring return control damper actuators shall be direct coupled type which require no crank arm and linkage and be capable of direct mounting to a jackshaft up to a 1.05" diameter. The actuator must provide modulating damper control in response to a 2 to 10 VDC or, with the addition of a 500Ω resistor, a 4 to 20 mA control input from an electronic controller or positioner. The actuators must be designed so that they may be used for either clockwise or counter clockwise fail-safe operation. Actuators shall use a brushless DC motor controlled by a microprocessor and be protected from overload at all angles of rotation. Run time shall be constant, and independent of torque. A 2 to 10 VDC feedback signal shall be provided for position feedback or primary and secondary applications. Actuators with auxiliary switches must be constructed to meet the requirements for Double Insulation so an electrical ground is not required to meet agency listings. Actuators shall be cULus listed, and be manufactured under ISO 9001 International Quality Control Standards.

Tools

Service Tool, with ZIP-USB function, for programmable and communicative actuators, VAV controller and HVAC performance devices

Factory Settings

Default parameters for 2 to 10 VDC applications of the AF..-MFT actuator are assigned during manufacturing. The parameters are variable and can be changed by three means: Factory pre-set or custom configuration, set by the customer using Act Net driver properties software or the handheld ZTH US.

Electrical Installation



Warning

Live electrical components! During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.



Meets cULus requirements without the need of an electrical ground connection.



Actuators with appliance cables are numbered.



Provide overload protection and disconnect as required.



Actuators may also be powered by DC 24 V.



Only connect common to negative (-) leg of control circuits.



A 500 Ω resistor (ZG-R01) converts the 4...20 mA control signal to 2...10 V.



Control signal may be pulsed from either the Hot (Source) or Common (Sink) 24 V line.



For triac sink the Common connection from the actuator must be connected to the Hot connection of the controller. Position feedback cannot be used with a triac sink controller; the actuator internal common reference is not compatible.



IN4004 or IN4007 diode



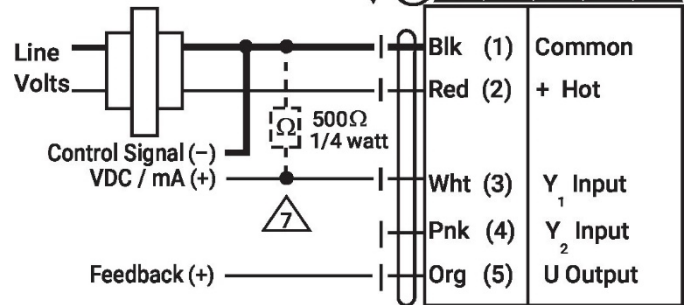
Actuators may be controlled in parallel when not mechanically linked. Current draw and input impedance must be observed.



Master-Slave wiring required for piggy-back applications when mechanically linked. Feedback from Master to control input(s) of Slave(s).

VDC/mA Control

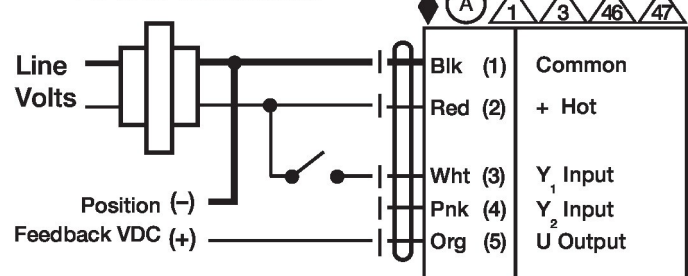
24 VAC Transformer



Wiring Diagrams

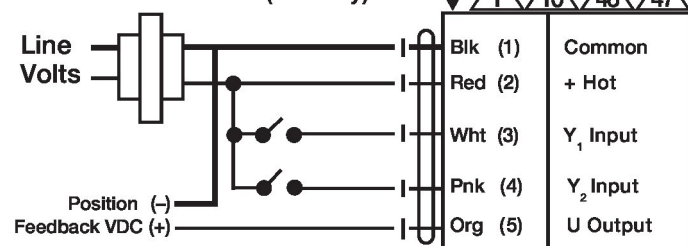
On/Off

24 VAC Transformer



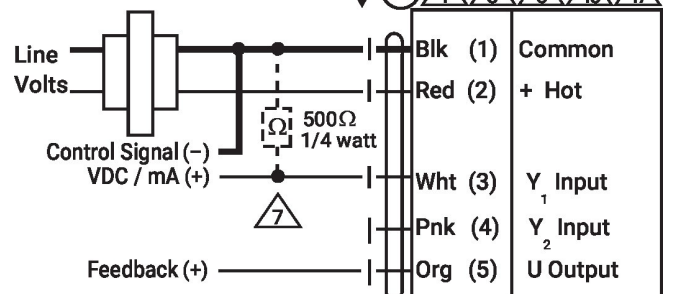
Floating Point

24 VAC Transformer (AC Only)



VDC/mA Control

24 VAC Transformer



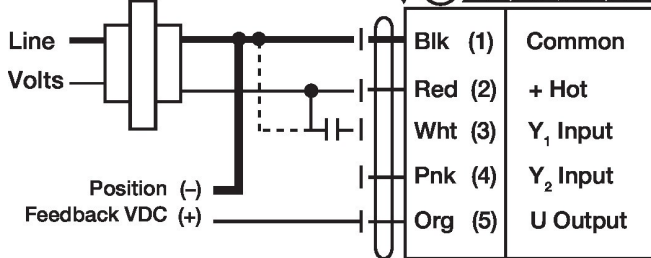
Electrical Installation continued

Dimensions

Wiring Diagrams continued

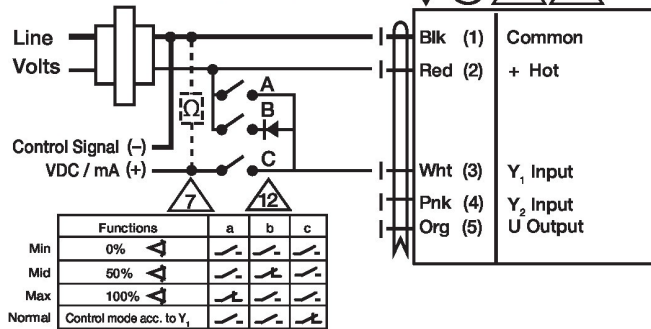
PWM Control

24 VAC Transformer (AC only)

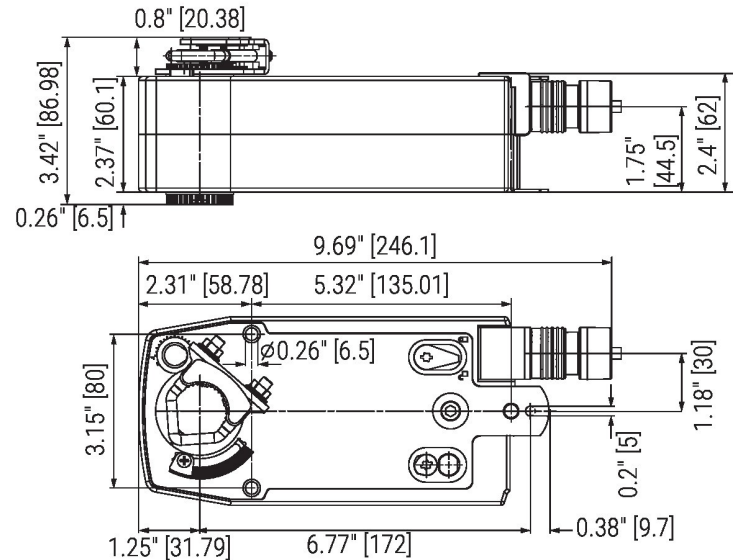
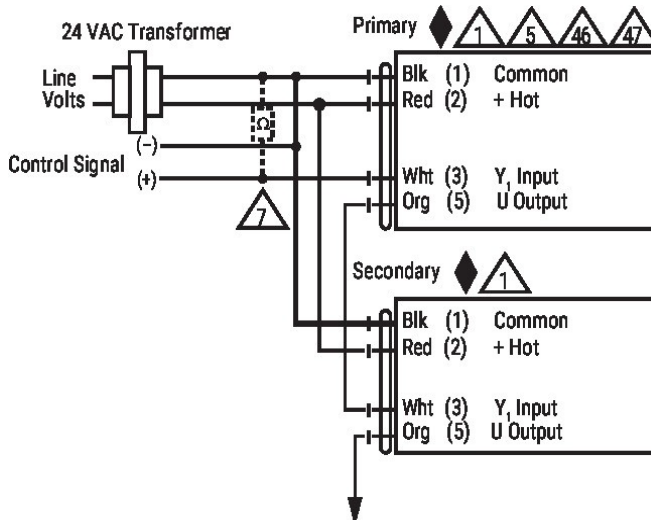


Override control

24 VAC Transformer (AC Only)



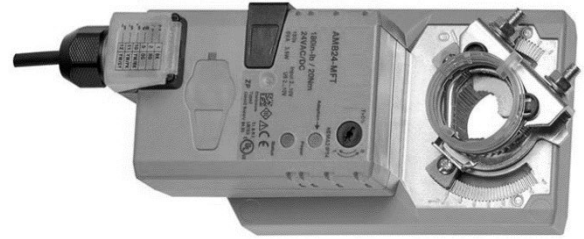
Primary – Secondary



AMB24-MFT Non-Failsafe Multi-function Damper Actuators

Basic Non Fail-Safe multifunction technology actuator for controlling dampers in typical commercial HVAC applications.

- Torque motor 180 in-lb [20 Nm]
- Nominal voltage AC/DC 24 V
- Control MFT/programmable
- Position feedback 2...10 V



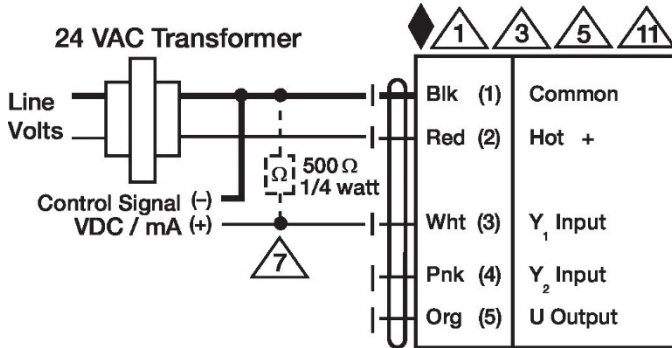
Electrical data		Product data
Nominal voltage	AC/DC 24 V	Application For proportional modulation of dampers in HVAC systems. Actuator sizing should be done in accordance with the damper manufacturer's specifications. The actuator is mounted directly to a damper shaft up to 1.05" in diameter by means of its universal clamp. A crank arm and several mounting brackets are available for applications where the actuator cannot be direct coupled to the damper shaft. The default parameters for 2...10 V applications of the ..MFT actuator are assigned during manufacturing. The parameters can be changed by two means: pre-set and custom configurations from us or on-site configurations using the Act Net driver properties pages software.
Nominal voltage frequency	50/60 Hz	
Nominal voltage range	AC 19.2...28.8 V / DC 21.6. V	
Power consumption in operation	3.5 W	
Power consumption in rest position	1.3 W	
Transformer sizing	6 VA	
Electrical Connection	18 GA plenum cable, 1 m, with 1/2" conduit connector, degree of protection NEMA 2 / IP54	
Overload Protection	electronic throughout 0...95° rotation	
Functional data		Operation The actuator is not provided with and does not require any limit switches, but is electronically protected against overload. The anti-rotation strap supplied with the actuator will prevent lateral movement. The actuator provides 95° of rotation and a visual indicator indicates position of the actuator. When reaching the damper or actuator end position, the actuator automatically stops. The gears can be manually disengaged with a button on the actuator cover. The actuators use a brushless DC motor, which is controlled by an Application Specific Integrated Circuit (ASIC). The ASIC monitors and controls the actuator's rotation and provides a digital rotation sensing (DRS) function to prevent damage to the actuator in a stall condition. Power consumption is reduced in holding mode. Add-on auxiliary switches are easily fastened directly onto the actuator body for signaling and switching functions.
Torque motor	180 in-lb [20 Nm]	
Operating range Y	2...10 V	
Operating range Y note	4...20 mA w/ ZG-R01 (500 Ω, 1/4 W resistor)	
Input impedance	100 kΩ for 2...10 V (0.1 mA), 500 Ω for 4...20 mA, 1500 Ω for PWM, On/Off and Floating point	
Operating range Y variable	Start point 0.5...30 V End point 2.5...32 V	
Operating modes optional	variable (VDC, PWM, on/off, floating point)	
Position feedback U	2...10 V	
Position feedback U note	Max. 0.5 mA	
Position feedback U variable	VDC variable	
Direction of motion motor	selectable with switch 0/1	
Manual override	external push button	
Angle of rotation	Max. 95°	
Angle of rotation note	adjustable with mechanical stop	
Running Time (Motor)	150 s / 90°	
Running time motor variable	90...350 s	

Functional data cont.		Product data cont.
Noise level, motor	45 dB(A)	Typical specification Modulating control damper actuators shall be electronic direct-coupled type, which require no crank arm and linkage and be capable of direct mounting to a shaft up to 3/4" diameter. Actuators must provide proportional damper control in response to a 2 to 10 VDC or, with the addition of a 500 Ω resistor, a 4 to 20 mA control input from an electronic controller or positioner. Actuators shall have brushless DC motor technology and be protected from overload at all angles of rotation. Run time shall be constant and independent of torque. A 2 to 10 VDC feedback signal shall be provided for position indication. Actuators shall be cULus listed, NEMA 4X, and be manufactured under ISO 9001 International Quality Control Standards.
Position indication	Mechanical, 30...65 mm stroke	
Weight	2.5 lb [1.2 kg]	
Housing material	UL94-5VA	
Safety data		Electrical accessories S2A Auxiliary switch 2 x SPDT add-on Tools ZTH US Service Tool, with ZIP-USB function, for programmable and communicative actuators, VAV controller and HVAC performedevices
Power source UL	Class 2 Supply	
Degree of protection IEC/EN	IP54	
Degree of protection NEMA/UL	NEMA 2	
Enclosure	UL Enclosure Type 2	
Agency Listing	cULus acc. to UL60730-1A/-2-14, CAN/CSA E60730-1:02 CE acc. to 2014/30/EU and 2014/35/EU	
Quality Standard	ISO 9001	
UL 2043 Compliant	Suitable for use in air plenums per Section 300.22(C) of the NEC and Section 602 of the IMC	
Ambient humidity	Max. 95% RH, non-condensing	
Ambient temperature	-22...122°F [-30...50°C]	
Storage temperature	-40...176°F [-40...80°C]	
Servicing	maintenance-free	
Footnotes †Rated Impulse Voltage 800V, Type action 1, Control Pollution Degree 3.		

Electrical Installation	
A Actuators with appliance cables are numbered. 1 Provide overload protection and disconnect as required. 3 Actuators may also be powered by DC 24 V. 5 Only connect common to negative (-) leg of control circuits. 7 A 500 Ω resistor (ZG-R01) converts the 4...20 mA control signal to 2...10 V.	8 Control signal may be pulsed from either the Hot (Source) or Common (Sink) 24 V line. 10 For triac sink the Common connection from the actuator must be connected to the Hot connection of the controller. Position feedback cannot be used with a triac sink controller; the actuator internal common reference is not compatible. 12 IN4004 or IN4007 diode.

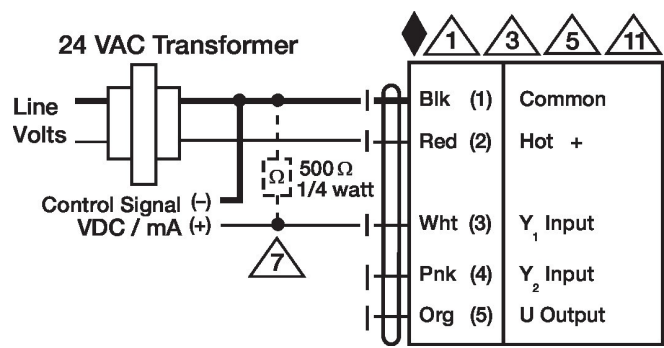
Electrical installation cont.

VDC/mA Control



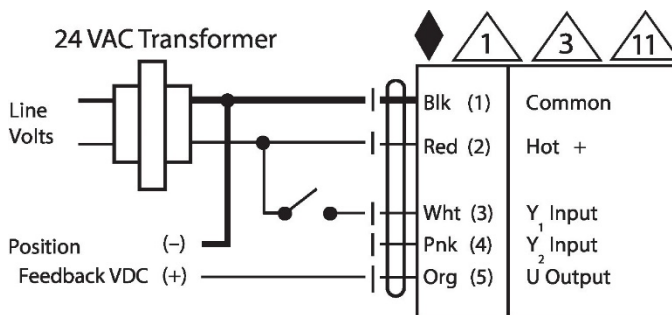
Wiring diagrams cont.

VDC/mA Control

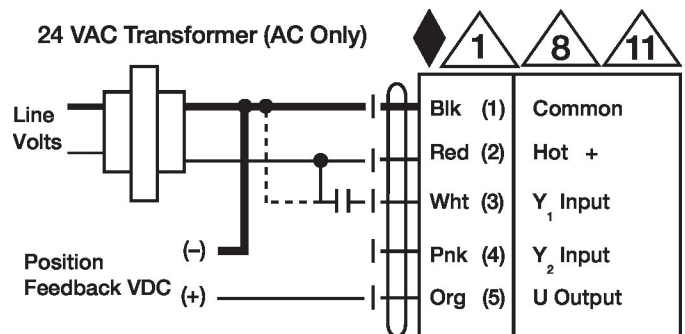


Wiring Diagrams

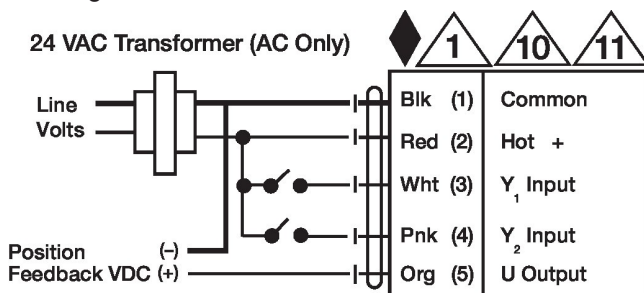
On/Off



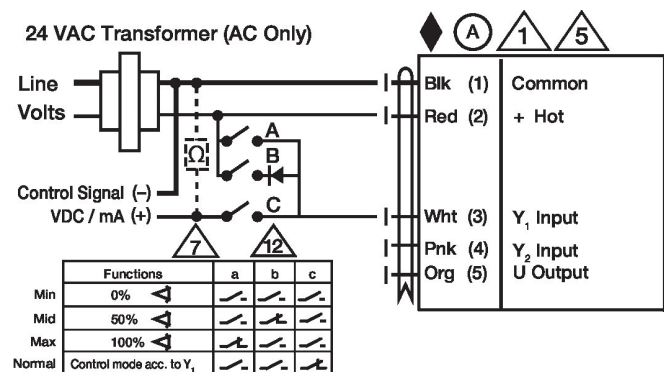
PWM Control



Floating Point



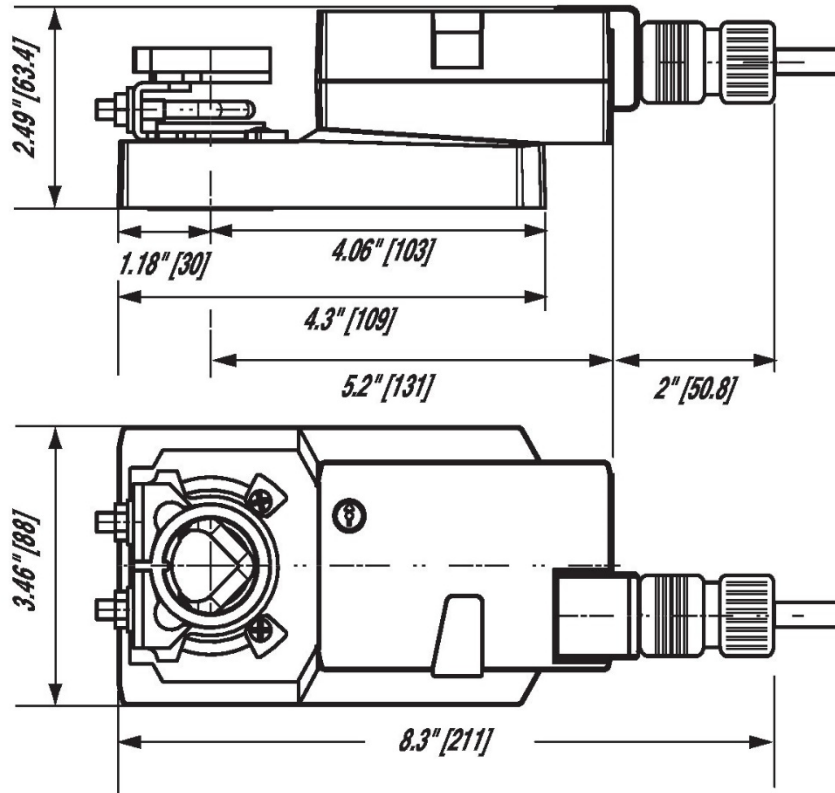
Override Control



Dimensions

Ø 1/2" to 1.05" [12.7 to 26.67]

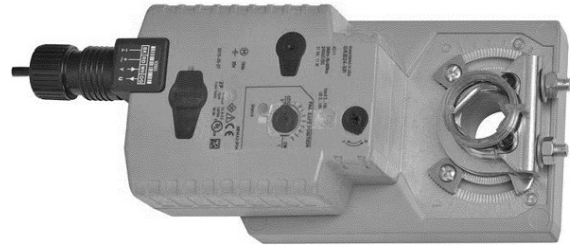
□ 2/5" to 1.05" [10 to 26.67]



GKB24-MFT Failsafe Multi-function Damper Actuators

Basic Fail-Safe multifunction technology actuator for controlling dampers in typical commercial HVAC applications.

- Torque motor 360 in-lb [40 Nm]
- Nominal voltage AC/DC 24 V
- Control MFT/programmable
- Position feedback 2...10 V



Electrical data		Product Features
Nominal voltage	AC/DC 24 V	Default Configuration Default parameters for 2 to 10 VDC applications of the GK..MFT actuator are assigned during manufacturing. The parameters are variable and can be changed by three means: Factory pre-set or custom configuration, set by the customer using Act Net driver properties pages or the handheld ZTH US.
Nominal voltage frequency	50/60 Hz	
Nominal voltage range	AC 19.2...28.8 V / DC 21.6. V	
Power consumption in operation	11 W	
Power consumption in rest position	3 W	
Transformer sizing	21 VA	
Electrical Connection	18 GA appliance or plenum cables, 1 m, 3 m or 5 m, with or without 1/2" conduit connector	
Overload Protection	electronic throughout 0...95° rotation	
Electrical Protection	actuators are double insulated	
Functional data		Application For fail-safe, modulating control of dampers in HVAC systems. Actuator sizing should be done in accordance with the damper manufacturer's specifications. A feedback signal is provided for position indication or primary and secondary applications. Maximum of two GK's can be piggybacked for torque loads of up to 720 in-lbs. Minimum 1" diameter shaft and primary and secondary wiring.
Torque motor	360 in-lb [40 Nm]	
Operating range Y	2...10 V	
Operating range Y note	4...20 mA w/ ZG-R01 (500 Ω, 1/4 W resistor)	
Input impedance	100 kΩ for 2...10 V (0.1 mA), 500 Ω for 4...20 mA, 1500 Ω for PWM, On/Off and Floating point	
Operating range Y variable	Start point 0.5...30 V End point 2.5...32 V	
Operating modes optional	variable (VDC, PWM, on/off, floating point)	
Position feedback U	2...10 V	
Position feedback U note	Max. 0.5 mA	
Position feedback U variable	VDC variable	
Setting Fail-Safe Position	adjustable with dial or tool 0...100% in 10% increments	Operation The GK..24-MFT provides 95° of rotation and a visual indicator shows the position of the actuator. When reaching the damper or actuator end position the actuator automatically stops. The gear can be manually disengaged by pressing the button located on the actuator cover. The GK..24-MFT actuator uses a brushless DC motor, which is controlled by an Application Specific Integrated Circuit (ASIC). The ASIC monitors and controls the actuators rotation and provides a digital rotation sensing (DRS) function to prevent damage to the actuator in a stall condition.
Bridging time (PF)	2 s	
Bridging time (PF) variable	0...10 s	
		Power consumption is reduced in a holding mode. The actuator is electronically protected against overload. The anti-rotation strap supplied with the actuator will prevent lateral movement. Add-on auxiliary switches are easily fastened directly onto the actuator body for signaling and switching functions.



#SDA – 11/8/24

Electrical data cont.		Product Features cont.
Pre-charging time	5...26 s	Typical Specification Modulating control, electrical fail-safe damper actuators shall be electronic direct-coupled type, which require no crank arm and linkage and be capable of direct mounting to shaft up to 1.05" diameter. Actuators must provide modulating damper control response to a 2 to 10 VDC or, with the addition of a 500Ω resistor, a 4 to 20 mA control input from an electronic controller or positioner. Actuators shall have brushless DC motor technology and be protected from overload at all angles of rotation. Actuators shall have reversing switch and manual override on the cover. Run time shall be constant and independent of torque. A 2 to 10 VDC feedback signal shall be provided for position feedback or primary and secondary applications. Actuators shall be cULus listed, and be manufactured under ISO 9001 International Quality Control Standards. Bridging Time Power failures can be bridged up to a maximum of 10 s. In the event of a power failure, the actuator will remain stationary in accordance with the set bridging time. If the power failure is greater than the set bridging time, the actuator will move into the selected fail-safe position. The bridging time set at the factory is 2 s. It can be modified on site in operation by means of the service tool MFT-P. Settings: The rotary knob must not be set to the "PROG FAIL-SAFE" position! Factory Setting Default parameters for 2 to 10 VDC applications of the GK..-MFT actuator are assigned during manufacturing. The parameters are variable and can be changed by three means: Factory pre-set or custom configuration, set by the customer using the handheld ZTH US. Electrical accessories Auxiliary switch 2 x SPDT add-on Tools ZTH US Service Tool, with ZIP-USB function, for programmable and communicative actuators, VAV controller and HVAC performance devices
Direction of motion motor	selectable with switch 0/1	
Direction of motion fail-safe	reversible with switch	
Manual override	external push button	
Angle of rotation	Max. 95°	
Angle of rotation note	adjustable with mechanical stop	
Running Time (Motor)	150 s / 90°	
Running time motor variable	90...150 s	
Running time fail-safe	<35 s	
Adaptation Setting Range	off (default)	
Override control	MIN (minimum pos) = 0% MID (intermediate pos) = 50% MAX (maximum pos) = 100%	
Noise level, motor	52 dB(A)	
Noise level, fail-safe	61 dB(A)	
Position indication	Mechanical, 30...65 mm stroke	
Weight	4.2 lb [2.0 kg]	
Materials	UL94-5VA	
Safety data		
Power source UL	Class 2 Supply	
Degree of protection IEC/EN	IP54	
Degree of protection NEMA/UL	NEMA 2	
Enclosure	UL Enclosure Type 2	
Agency Listing	cULus acc. to UL60730-1A/-2-14, CAN/CSA E60730-1:02, CE acc. to 2014/30/EU	
Quality Standard	ISO 9001	
UL 2043 Compliant	Suitable for use in air plenums per Section 300.22(C) of the NEC and Section 602 of the IMC	
Ambient humidity	Max. 95% RH, non-condensing	
Ambient temperature	-22...122°F [-30...50°C]	
Storage temperature	-40...176°F [-40...80°C]	
Servicing	maintenance-free	
*Variable when configured with MFT options. †Rated Impulse Voltage 800V, Type of action 1.AA, Control Pollution Degree 3		

Electrical installation



Warning

Live electrical components! During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.

Meets cULus requirements without the need of an electrical ground connection.

1

Provide overload protection and disconnect as required.

3

Actuators may also be powered by DC 24 V.

5

Only connect common to negative (-) leg of control circuits.

7

A 500 Ω resistor (ZG-R01) converts the 4...20 mA control signal to 2...10 V.

8

Control signal may be pulsed from either the Hot (Source) or Common (Sink) 24 V line.

10

For triac sink the Common connection from the actuator must be connected to the Hot connection of the controller. Position feedback cannot be used with a triac sink controller; the actuator internal common reference is not compatible.

12

IN4004 or IN4007 diode.

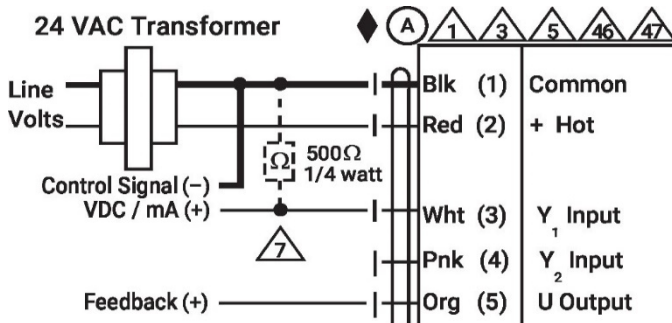
46

Actuators may be controlled in parallel. Current draw and input impedance must be observed.

47

Master-Slave wiring required for piggy-back applications. Feedback from Master to control input(s) of Slave(s).

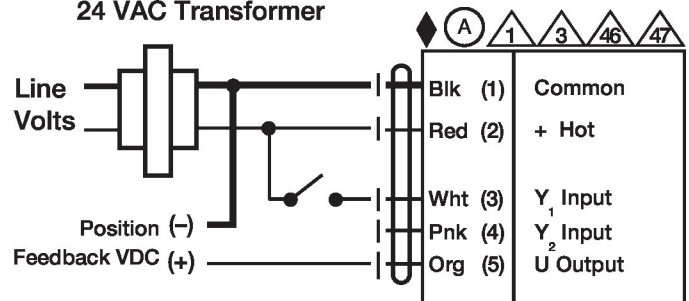
VDC/mA Control



Wiring Diagrams

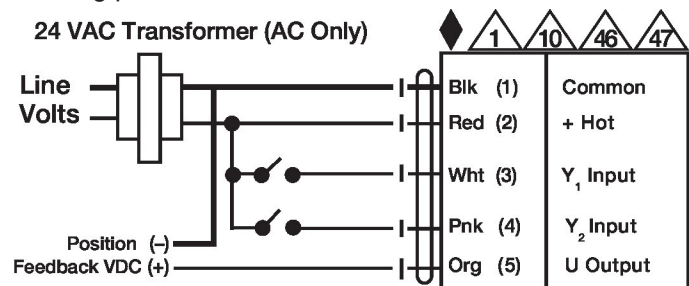
On/Off

24 VAC Transformer



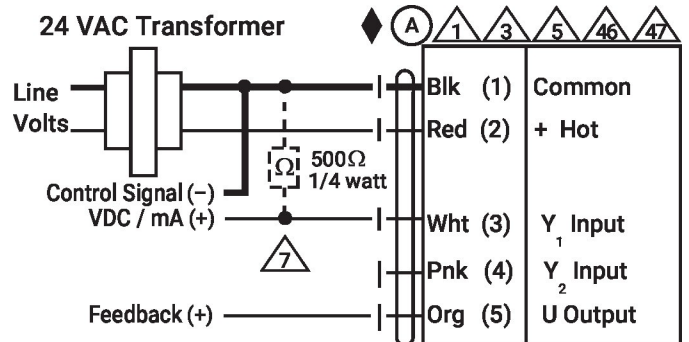
Floating point

24 VAC Transformer (AC Only)



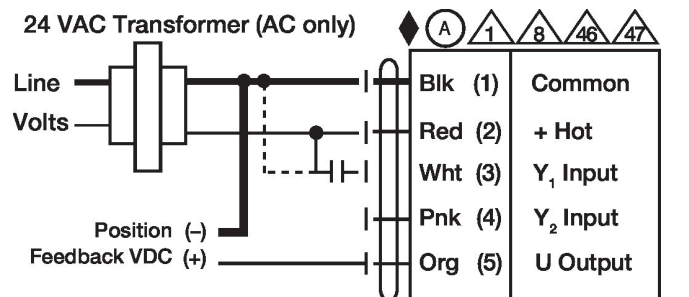
VDC/mA Control

24 VAC Transformer



PWM control

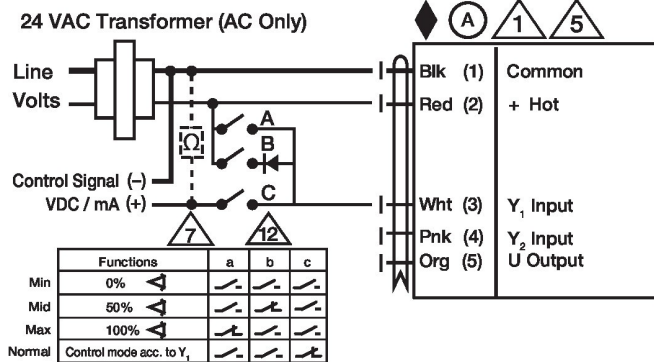
24 VAC Transformer (AC only)



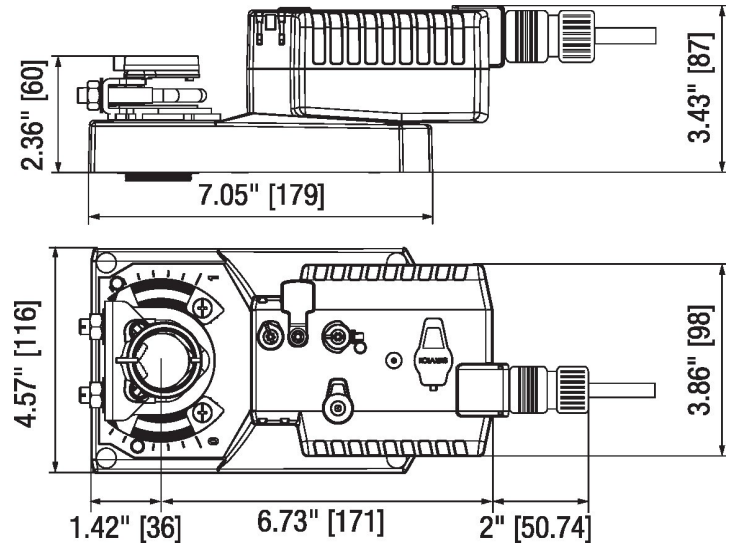
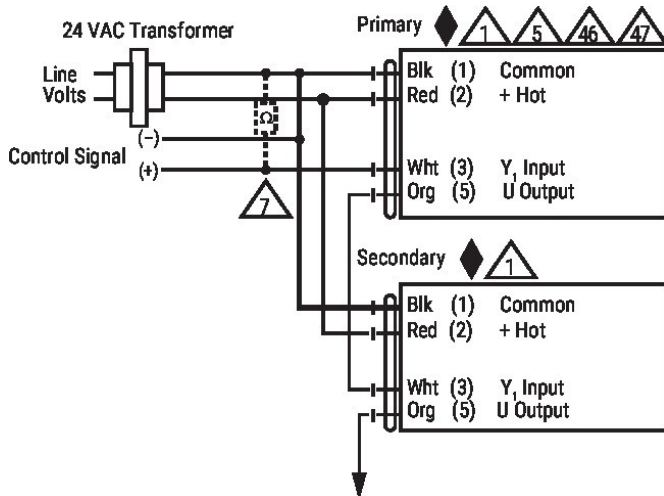
Wiring diagrams cont.

Dimensions

Override control



Primary-secondary



GMB24-MFT Non-Failsafe Multifunction Damper Actuators

Basic Non Fail-Safe multifunction technology actuator for controlling dampers in typical commercial HVAC applications.

- Torque motor 360 in-lb [40 Nm]
- Nominal voltage AC/DC 24 V
- Control MFT/programmable
- Position feedback 2...10 V



Electrical data		Product features
Nominal voltage	AC/DC 24 V	Application <p>For proportional modulation of dampers in HVAC systems. Actuator sizing should be done in accordance with the damper manufacturer's specifications.</p> <p>The actuator is mounted directly to a damper shaft up to 1.05" in diameter by means of its universal clamp. A crank arm and several mounting brackets are available for applications where the actuator cannot be direct coupled to the damper shaft.</p> <p>The default parameters for 2...10 V applications of the ..MFT actuator are assigned during manufacturing. The parameters can be changed by two means: pre-set and custom configurations from Carrier® or on-site configurations using the Act Net driver properties.</p>
Nominal voltage frequency	50/60 Hz	
Nominal voltage range	AC 19.2...28.8 V / DC 21.6. V	
Power consumption in operation	4 W	
Power consumption in rest position	1.5 W	
Transformer sizing	7 VA	
Electrical Connection	18 GA plenum cable, 1 m, with 1/2" conduit connector, degree of protection NEMA 2 / IP54	
Overload Protection	electronic throughout 0...95° rotation	
Functional data		Operation <p>The actuator is not provided with and does not require any limit switches, but is electronically protected against overload. The anti-rotation strap supplied with the actuator will prevent lateral movement.</p> <p>The GMB(X) series provides 95° of rotation and a visual indicator indicates position of the actuator. When reaching the damper or actuator end position, the actuator automatically stops. The gears can be manually disengaged with a button on the actuator cover.</p> <p>The GMB(X)24-MFT actuators use a brushless DC motor, which is controlled by an Application Specific Integrated Circuit (ASIC). The ASIC monitors and controls the actuator's rotation and provides a digital rotation sensing (DRS) function to prevent damage to the actuator in a stall condition. Power consumption is reduced in holding mode.</p> <p>Add-on auxiliary switches are easily fastened directly onto the actuator body for signaling and switching functions.</p>
Torque motor	360 in-lb [40 Nm]	
Operating range Y	2...10 V	
Operating range Y note	4...20 mA w/ ZG-R01 (500 Ω, 1/4 W resistor)	
Input impedance	100 kΩ for 2...10 V (0.1 mA), 500 Ω for 4...20 mA, 1500 Ω for PWM, On/Off and Floating point	
Operating range Y variable	Start point 0.5...30 V End point 2.5...32 V	
Operating modes optional	variable (VDC, on/off, floating point)	
Position feedback U	2...10 V	
Position feedback U note	Max. 0.5 mA	
Position feedback U variable	VDC variable	
Direction of motion motor	selectable with switch 0/1	
Manual override	external push button	
Angle of rotation	Max. 95°	
Angle of rotation note	adjustable with mechanical stop	

Functional data cont.		Product features cont.	
Running Time (Motor)	150 s / 90°	Typical specification Floating point, on/off control damper actuators shall be electronic direct-coupled type, which require no crank arm and linkage and be capable of direct mounting to a shaft up to 1.05" diameter. Actuators shall have brushless DC motor technology and be protected from overload at all angles of rotation. Actuators shall have reversing switch and manual override on the cover. Run time shall be constant and independent of torque. Actuators shall be cULus listed, and be manufactured under ISO 9001 International Quality Control Standards.	
Running time motor variable	75...300 s		
Noise level, motor	45 dB(A)		
Position indication	Mechanical, 30...65 mm stroke		
Weight	4.2 lb [1.9 kg]		
Housing material	UL94-5VA		
Safety data		Tools ZTH US:..... Service Tool, with ZIP-USB function, for programmable and communicative actuators, VAV controller and HVAC performance devices.	
Power source UL	Class 2 Supply		
Degree of protection IEC/EN	IP54		
Degree of protection NEMA/UL	NEMA 2		
Enclosure	UL Enclosure Type 2		
Agency Listing	cULus acc. to UL60730-1A/-2-14, CAN/CSA E60730-1:02 CE acc. to 2014/30/EU and 2014/35/EU		
Quality Standard	ISO 9001	Electrical installation cont.	
UL 2043 Compliant	Suitable for use in air plenums per Section 300.22(C) of the NEC and Section 602 of the IMC		
Ambient humidity	Max. 95% RH, non-condensing		
Ambient temperature	-22...122°F [-30...50°C]		
Storage temperature	-40...176°F [-40...80°C]		
Servicing	maintenance-free		
†Rated Impulse Voltage 800V, Type action 1, Control Pollution Degree 3.		<div><div><div><div><div><div>10</div><div>For triac sink the Common connection from the actuator must be connected to the Hot connection of the controller. Position feedback cannot be used with a triac sink controller; the actuator internal common reference is not compatible.</div></div><div><div>12</div><div>IN4004 or IN4007 diode.</div></div><div><div>46</div><div>Actuators may be controlled in parallel. Current draw and input impedance must be observed.</div></div><div><div>47</div><div>Master-Slave wiring required for piggy-back applications. Feedback from Master to control input(s) of Slave(s).</div></div></div></div><div>VDC/mA Control</div><div><div><div>24 VAC Transformer</div><div><div><div>Line</div><div>Volts</div></div><div><div>Control Signal (-)</div><div>VDC / mA (+)</div></div><div><div>Feedback (+)</div></div></div><div><div><div>500Ω</div><div>1/4 watt</div></div><div><div>7</div></div></div></div><div><div><div><div><div><div>A</div><div>1</div><div>3</div><div>5</div><div>46</div><div>47</div></div><div><div>Blk (1)</div><div>Red (2)</div><div>Wht (3)</div><div>Pnk (4)</div><div>Org (5)</div></div><div><div>Common + Hot</div><div>Y₁ Input</div><div>Y₂ Input</div><div>U Output</div></div></div></div></div></div></div></div></div>	



For triac sink the Common connection from the actuator must be connected to the Hot connection of the controller. Position feedback cannot be used with a triac sink controller; the actuator internal common reference is not compatible.



IN4004 or IN4007 diode.

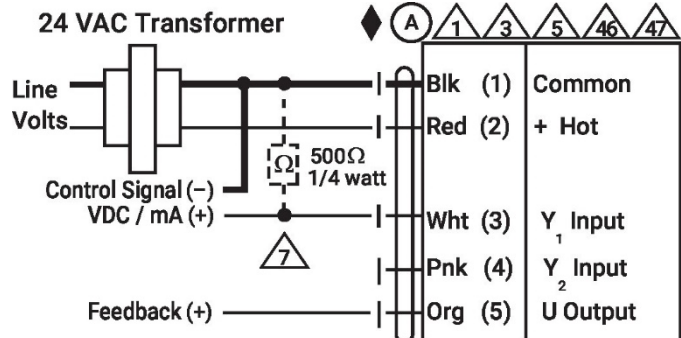


Actuators may be controlled in parallel. Current draw and input impedance must be observed.



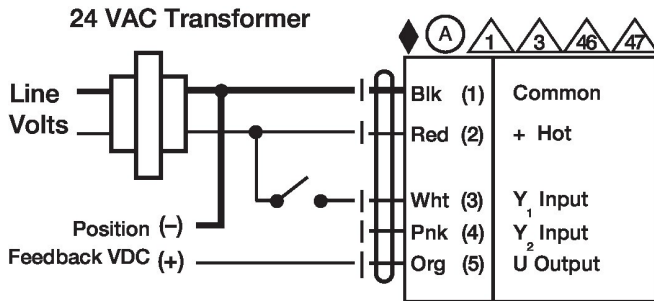
Master-Slave wiring required for piggy-back applications. Feedback from Master to control input(s) of Slave(s).

VDC/mA Control

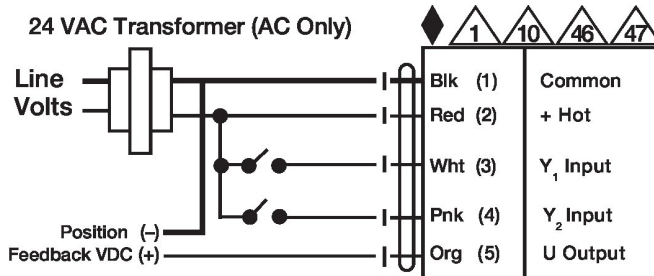


Wiring diagrams

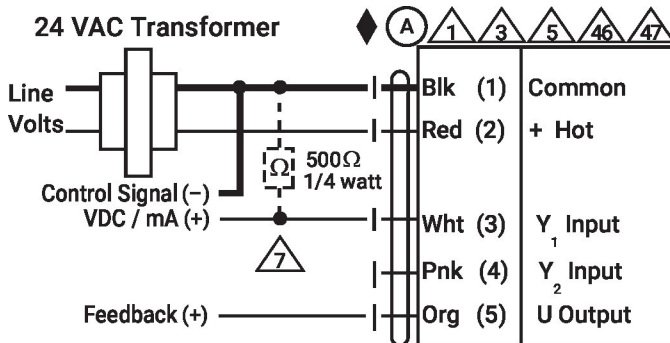
On/Off



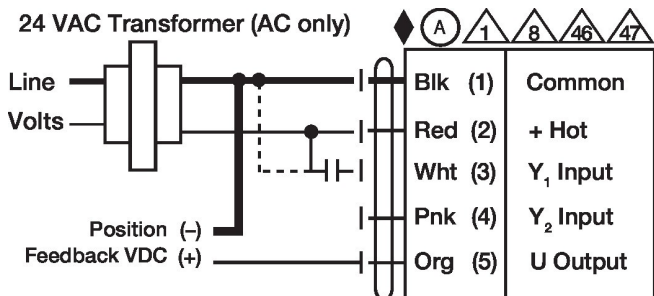
Floating point



VDC/mA Control

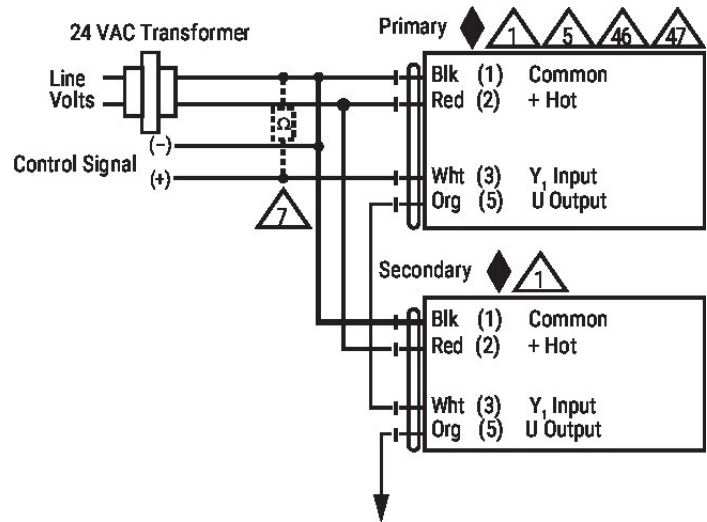


PWM control



Wiring diagrams cont.

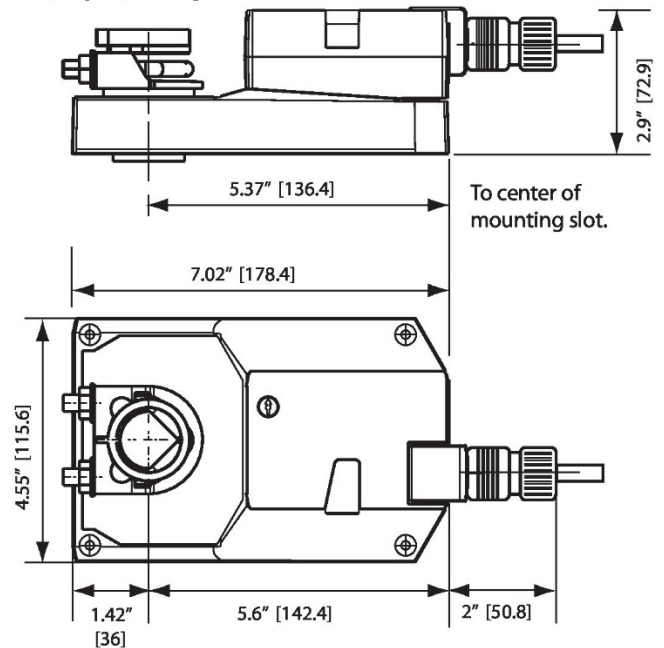
Primary – Secondary



Dimensions

 \varnothing 1/2" to 1.05" [12.7 to 26.67]

□ 2/5" to 1.05" [10 to 26.67]



LF24-MFT Actuators, Multi-Function Technology


MFT

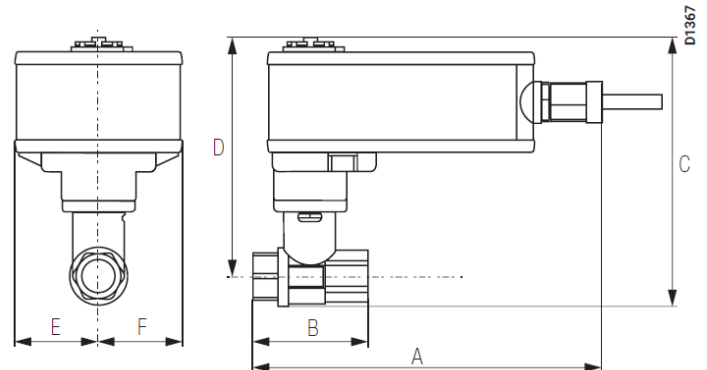

Technical Data	
Control	MFT
Control signal	2 to 10 VDC
Power consumption	running 2.5 W holding 1 W
Transformer sizing	5 VA (class 2 power source)
Electrical connection	½" conduit connector (-S models have 2 cables) 3 ft [1m], 18 GA appliance cable
Overload protection	electronic throughout 0° to 95° rotation
Feedback output	2 to 10 VDC, 0.5 mA max
Input impedance	100 kΩ for 2 to 10 VDC (0.1 mA) 500 Ω for 4 to 20mA 750 Ω for PWM 500 Ω for on/off and floating point
Angle of rotation	95°
Direction of rotation	spring reversible with CW/CCW mounting motor reversible with built-in switch
Position indication	visual indicator
Running time	motor 150 seconds independent of load (proportional, default) spring <25 seconds @ -4°F to 122°F [-20°C to 50°C] <60 seconds @ -22°F [-30°C]
Ambient temperature	-22° F to 122° F [-30° C to 50° C]
Housing	NEMA 2
Agency listings	cULus according to UL 873 and CAN/CSA C22.2 No. 24-93
Noise level (max)	running <30 dB(A) spring return 62 dB(A)
Quality standard	ISO 9001
LF24-MFT-S US	
Auxiliary switch	1 x SPDT, 6A (1.5A) @ 250 VAC, UL Listed, adjustable 0° to 95° (double insulated)

Models

LF24-MFT US

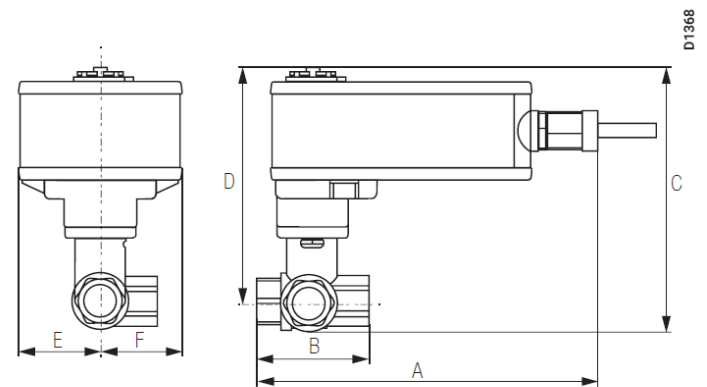
LF24-MFT-S US w/ built-in Aux. Switch

Dimensions with 2-Way Valve



		Valve Nominal Size		Dimensions (Inches [mm])	
Valve Body	Inches	DN [mm]	A	B	
B207-B211	½"	15	2.41" [61.1]	1.39" [35.2]	
B212-B215	½"	15	2.38" [60.4]	1.78" [45.2]	
B217-B220	¾"	20	2.73" [69.3]	1.87" [47.4]	
B222-B225	1"	25	3.09" [78.4]	1.87" [47.4]	
B229-B230	1¼"	32	3.72" [94.6]	1.87" [47.4]	

Dimensions with 3-Way Valve



		Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	Inches	DN [mm]	A	B	C	
B307-B311	½"	15	2.41" [61.1]	1.39" [35.2]	1.20" [30.6]	
B312-B315	½"	15	2.38" [60.4]	1.78" [45.2]	1.29" [32.8]	
B317-B320	¾"	20	2.73" [69.3]	1.87" [47.4]	1.47" [37.3]	
B322-B325	1"	25	3.09" [78.4]	1.87" [47.4]	1.59" [40.3]	

Wiring Diagrams

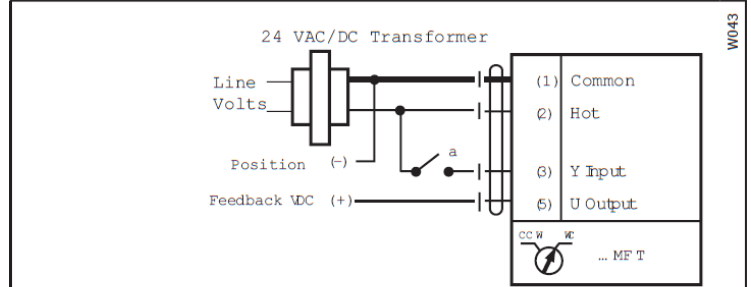
INSTALLATION NOTES

- 2 **CAUTION Equipment damage!**
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.
- 4 IN4004 or IN4007 diode (IN4007 supplied, Belimo part number 40155).
- 5 Triac A and B can also be contact closures.
- 6 Control signal may be pulsed from either the Hot (Source) or Common (Sink) 24 VAC line.
- 7 Position feedback cannot be used with Triac sink controller. The actuators internal common reference is not compatible.

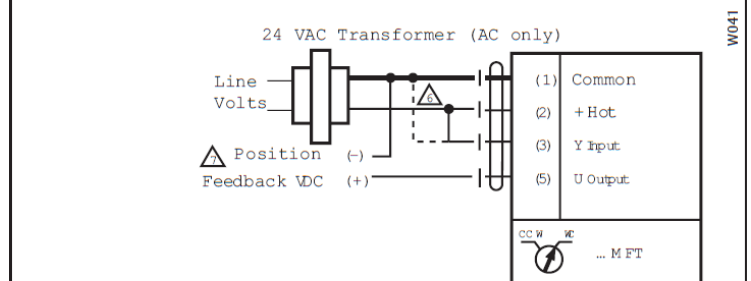
APPLICATION NOTES

- ◆ The ZG-R01 500 Ω resistor converts the 4 to 20 mA control signal to 2 to 10 VDC, up to 2 actuators may be connected in parallel.

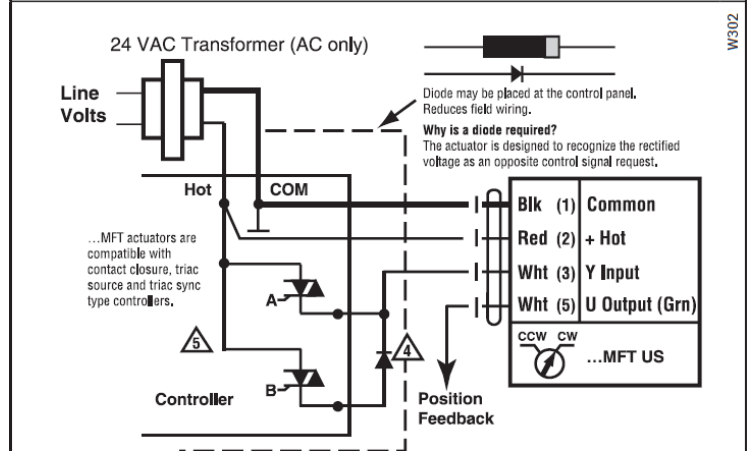
WARNING Live Electrical Components!
During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.



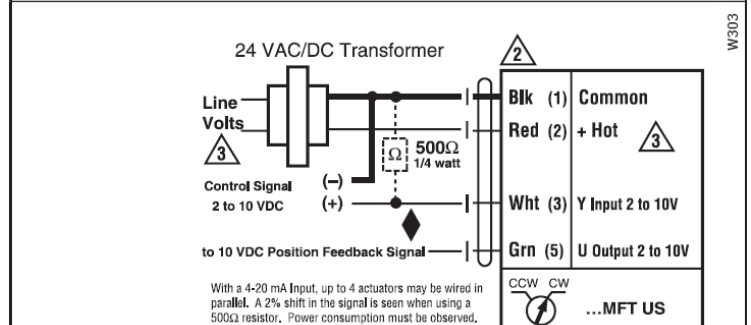
On/Off control



PWM, triac source and sink



Floating Point control



Proportional 2 to 10 or 4 to 20 mA control signal

LMB24-MFT Non-Failsafe Multifunction Damper Actuators

Basic Non Fail-Safe multifunction technology actuator for controlling dampers in typical commercial HVAC applications.

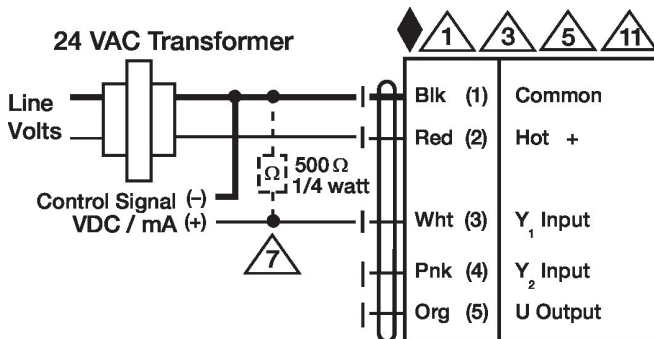
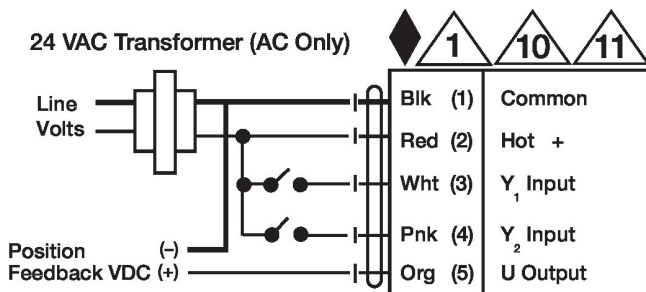
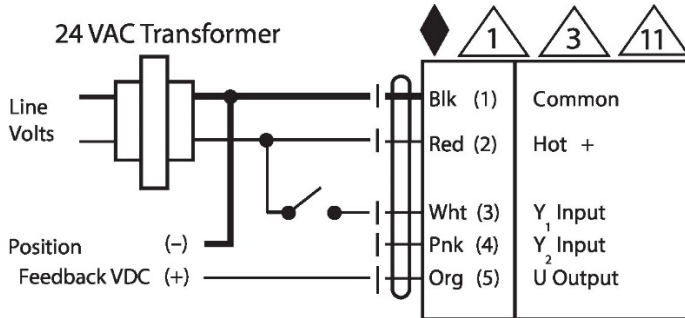
- Torque motor 45 in-lb [5 Nm]
- Nominal voltage AC/DC 24 V
- Control MFT/programmable
- Position feedback 2...10 V



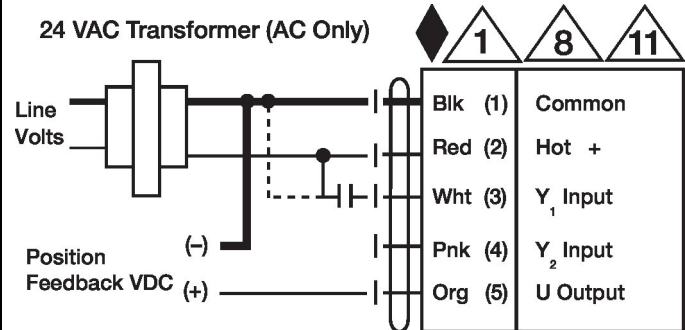
Electrical data		Product features
Nominal voltage	AC/DC 24 V	Application <p>For proportional modulation of dampers in HVAC systems. Actuator sizing should be done in accordance with the damper manufacturer's specifications. The actuator is mounted directly to a damper shaft from 1/4" up to 5/8" in diameter by means of its universal clamp. Shafts up to 3/4" diameter can be accommodated by an accessory clamp.</p> <p>The default parameters for 2...10 V applications of the ..MFT actuator are assigned during manufacturing. The parameters can be changed by two means: pre-set and custom configurations from us or on-site configurations using the Act Net driver properties.</p> Operation <p>The actuator is not provided with and does not require any limit switches, but is electronically protected against overload. The anti-rotation strap supplied with the actuator will prevent lateral movement.</p> <p>The LMB(X) series provides 95° of rotation and a visual indicator indicates position of the actuator. When reaching the damper or actuator end position, the actuator automatically stops. The gears can be manually disengaged with a button on the actuator cover.</p> <p>The LMB(X)24-MFT... actuators use a brushless DC motor, which is controlled by an Application Specific Integrated Circuit (ASIC). The ASIC monitors and controls the actuator's rotation and provides a digital rotation sensing (DRS) function to prevent damage to the actuator in a stall condition. Power consumption is reduced in holding mode.</p> <p>Add-on auxiliary switches are easily fastened directly onto the actuator body for signaling and switching functions.</p>
Nominal voltage frequency	50/60 Hz	
Nominal voltage range	AC 19.2...28.8 V / DC 21.6. V	
Power consumption in operation	2.5 W	
Power consumption in rest position	1.2 W	
Transformer sizing	5 VA	
Electrical Connection	18 GA plenum cable with 1/2" conduit connector, degree of protection NEMA 2 / IP54, 1 m 3 m and 5 m	
Overload Protection	electronic throughout 0...95° rotation	
Functional data		
Torque motor	45 in-lb [5 Nm]	
Operating range Y	2...10 V	
Operating range Y note	4...20 mA w/ ZG-R01 (500 Ω, 1/4 W resistor)	
Input impedance	100 kΩ for 2...10 V (0.1 mA), 500 Ω for 4...20 mA, 1500 Ω for PWM, On/Off and Floating point	
Operating range Y variable	Start point 0.5...30 V End point 2.5...32 V	
Operating modes optional	variable (VDC, on/off, floating point)	

Functional data cont.		Product features cont.		
Position feedback U	2...10 V	Typical specification Proportional control damper actuators shall be electronic direct-coupled type, which require no crank arm and linkage and be capable of direct mounting to a shaft from 1/4" to 5/8" diameter. Actuators must provide control in response to a control input from an electronic controller or positioner. Actuators shall have brushless DC motor technology and be protected from overload at all angles of rotation. Actuators shall have reversing switch and manual override on the cover. Run time shall be constant and independent of torque. Actuators shall be cULus listed, and be manufactured under ISO 9001 International Quality Control Standards.		
Position feedback U note	Max. 0.5 mA			
Position feedback U variable	VDC variable			
Direction of motion motor	selectable with switch 0/1			
Manual override	external push button			
Angle of rotation	Max. 95°			
Angle of rotation note	adjustable with mechanical stop			
Running Time (Motor)	95 s / 90°			
Running time motor variable	35...150 s			
Noise level, motor	35 dB(A)			
Position indication	Mechanical, 30...65 mm stroke	Accessories Electrical accessories S2A..... Auxiliary switch 2 x SPDT add-on Tools ZTH US Service Tool, with ZIP-USB function, for programmable and communicative actuators, VAV controller and HVAC performance devices		
Weight	1.3 lb [0.59 kg]			
Housing material	UL94-5VA			
Safety data				
Power source UL	Class 2 Supply			
Degree of protection IEC/EN	IP54			
Degree of protection NEMA/UL	NEMA 2			
Enclosure	UL Enclosure Type 2			
Agency Listing	cULus acc. to UL60730-1A/-2-14, CAN/CSA E60730-1:02 CE acc. to 2014/30/EU and 2014/35/EU			
Quality Standard	ISO 9001			
UL 2043 Compliant	Suitable for use in air plenums per Section 300.22(C) of the NEC and Section 602 of the IMC	Electrical installation cont. <div><div><div>8</div><div>Control signal may be pulsed from either the Hot (Source) or Common (Sink) 24 V line.</div></div><div><div>10</div><div>For triac sink the Common connection from the actuator must be connected to the Hot connection of the controller. Position feedback cannot be used with a triac sink controller; the actuator internal common reference is not compatible.</div></div><div><div>12</div><div>IN4004 or IN4007 diode.</div></div><div>VDC/mA Control</div><div><div><div>24 VAC Transformer</div><div><div><div>Line</div><div>Volts</div></div><div><div><div><div><div></div><div></div><div></div></div><div><div></div><div></div><div></div></div><div><div></div><div></div><div></div></div></div><div><div>Control Signal (-)</div><div>VDC / mA (+)</div></div><div><div>500 Ω</div><div>1/4 watt</div></div><div><div>7</div></div></div><div><div><div>1</div><div>3</div><div>5</div><div>11</div></div><div><div>Blk (1)</div><div>Red (2)</div><div>Wht (3)</div><div>Pnk (4)</div><div>Org (5)</div></div><div><div>Common</div><div>Hot +</div><div>Y₁ Input</div><div>Y₂ Input</div><div>U Output</div></div></div></div></div></div></div></div>		
Ambient humidity	Max. 95% RH, non-condensing			
Ambient temperature	-22...122°F [-30...50°C]			
Storage temperature	-40...176°F [-40...80°C]			
Servicing	maintenance-free			
Electrical installation cont.				
<div>A</div> Actuators with appliance cables are numbered.	<div><div>1</div><div>Provide overload protection and disconnect as required.</div></div> <div><div>3</div><div>Actuators may also be powered by DC 24 V.</div></div> <div><div>5</div><div>Only connect common to negative (-) leg of control circuits.</div></div> <div><div>7</div><div>A 500 Ω resistor (ZG-R01) converts the 4...20 mA control signal to 2...10 V.</div></div>			

Wiring Diagrams



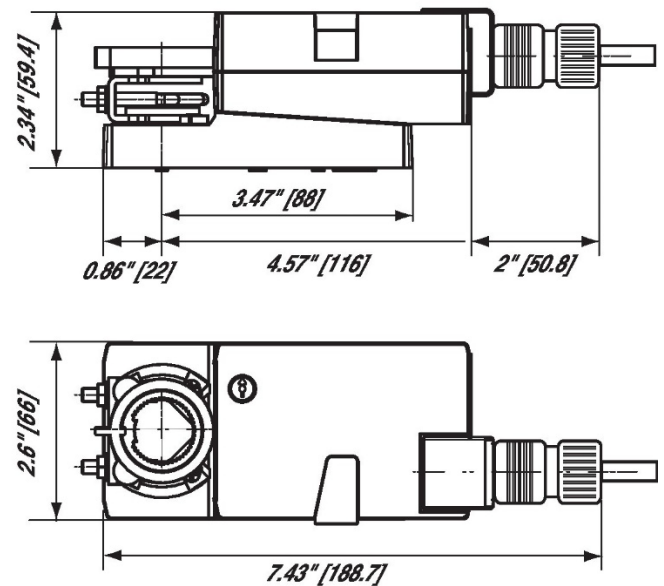
Wiring Diagrams cont.



Dimensions

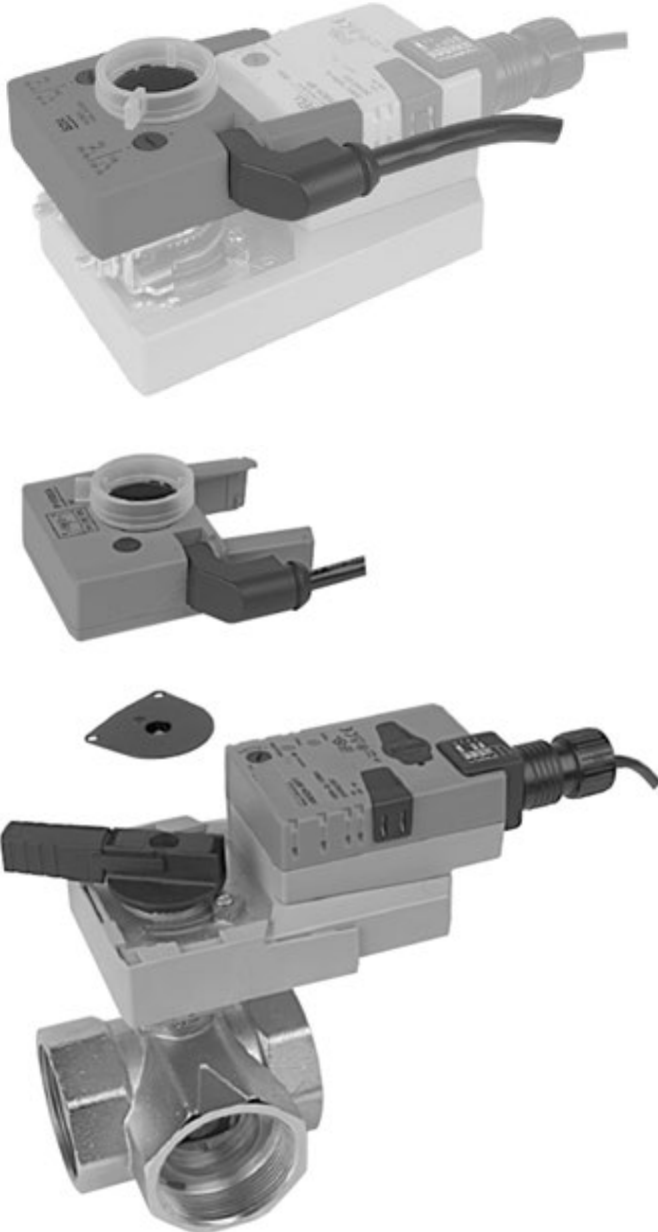
Ø 1/4" to 3/4" [6 to 20]

□ 5/16" to 3/4" [8 to 26]



Accessories, Smart Valve and Smart Damper Actuators Auxiliary Switches, S2A

For non-spring return direct-coupled actuators



Mounting Instructions

1. Press down the manual override button and rotate the actuator fully counter clockwise.
2. Place the switch/potentiometer adaptor onto the hex shaft of the handle which is in the center of the valve/actuator coupling.
3. Slide switch onto the actuator using the actuator guiding grooves on the sides of the actuator.
4. Check for correct mating of the adaptor to the switch.
5. Adjust switch dials as necessary.

Application

The S2A auxiliary switches are used to indicate when a desired position of a valve is reached or to interface additional controls for a specific control sequence.

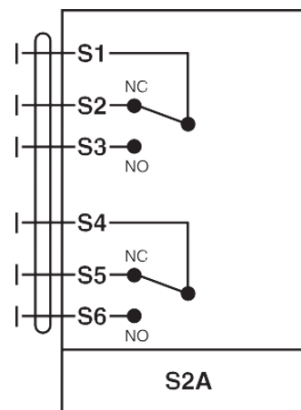
Operation

The S2A auxiliary switches are mounted onto the direct coupled actuator. The switches are modular units that mount directly onto LRB and AR type actuators and are locked into place by guiding grooves on the sides of the actuator.

A driver disk is attached to the actuator handle and offers direct transmission of the actuator position to the micro switch cams. The switching points can be set over the full scale of 0 to 1 simply by adjusting the slotted discs




Types		
S2A	2 SPDT	3 ft, 18 GA Appliance Cable
Technical Data S2A		
Number of switches	2 SPDT	
Weight	6.0 oz [170 g]	
Switching capacity	3A (0.5A), 250 VAC	
Switching point	adjustable over full rotation (0° to 95°)	
Pre-setting	with scale possible	
Humidity	5 to 95% RH non-condensing	
Ambient temperature	-22°F to 122°F [-30°C to +50°C]	
Storage temperature	-40°F to 176°F [-40°C to 80°C]	
Housing	NEMA 2 / IP54	
Housing rating	UL94-5VA	
Servicing	maintenance free	
Agency listings	cULus acc. to UL60730-CE according to 73/23/EEC	
Quality standard	ISO 900	

Wiring Diagram





Appendix – Symbols Key

 Warning	Potential for death, serious injury, or permanent damage to a system.
 Caution	Potential for injury, damage to a system, or system failure.
 Tip	Useful information not related to injury or system damage.