

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
Nominal voltage frequency	50/60 Hz	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 range	AC 19.2...28.8 V / DC 21.6. V	
Power consumption in operation	7.5 W	Application
Power consumption in rest position	3 W	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.
Transformer sizing	10 VA	When not mechanically linked, actuators must be wired in parallel.
Electrical Connection	18 GA appliance cable, 1 m, with 1/2" conduit connector	Operation
Overload Protection	electronic throughout 0...95° rotation	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.
Electrical Protection	actuators are double insulated	
Functional data		
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	
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

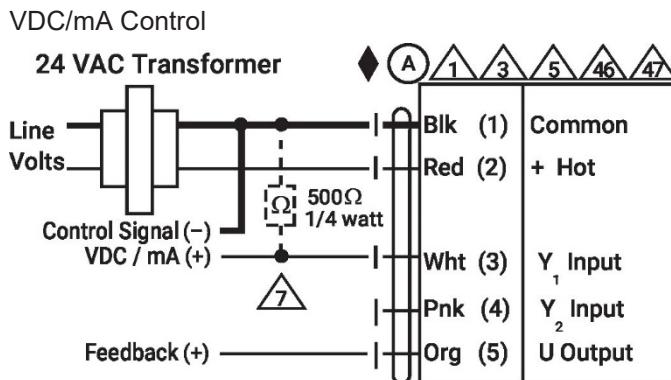
Factory Settings

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



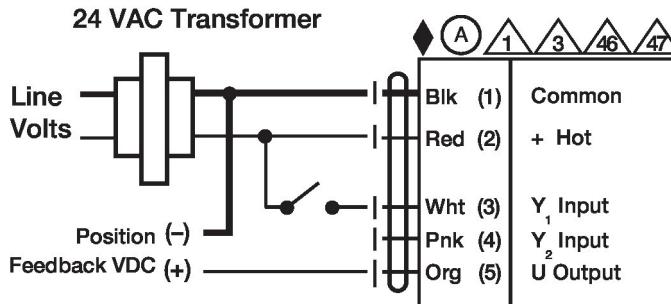
Live electrical components! During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform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



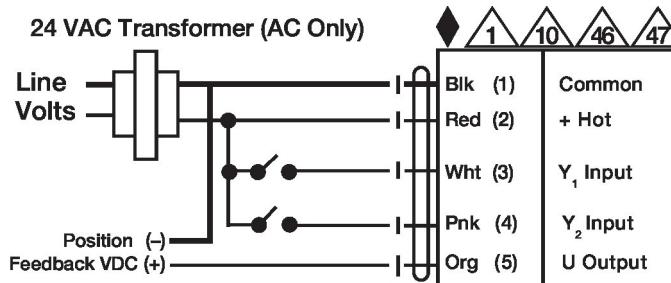
- ◆ Meets cULus requirements without the need of an electrical ground connection.
- (A) Actuators with appliance cables are numbered.
- 1 Provide overload protection and disconnect as required.
- 3 Actuators may also be powered by DC 24 V.
- 5 Only connect common to negative (-) leg of control circuits.
- 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
- 67 Actuators may be controlled in parallel when not mechanically linked. Current draw and input impedance must be observed.
- 68 Master-Slave wiring required for piggy-back applications when mechanically linked. Feedback from Master to control input(s) of Slave(s).

Wiring Diagrams

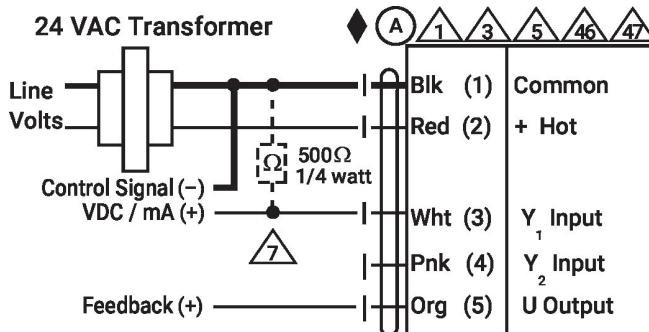
On/Off

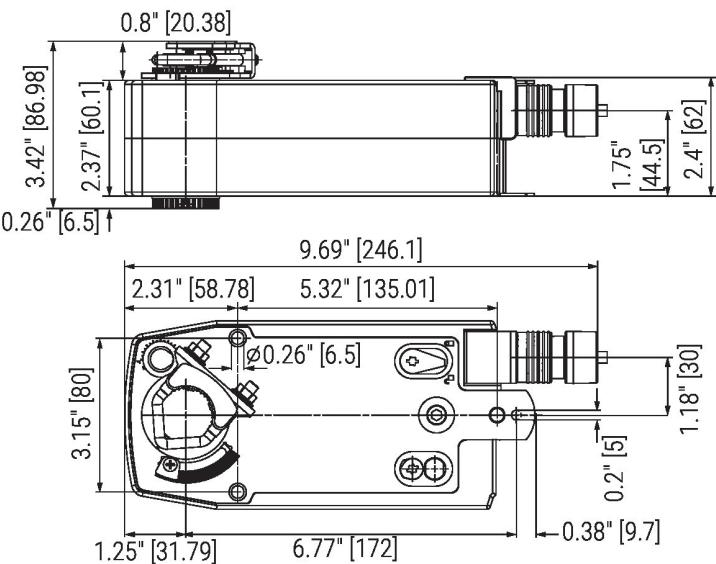
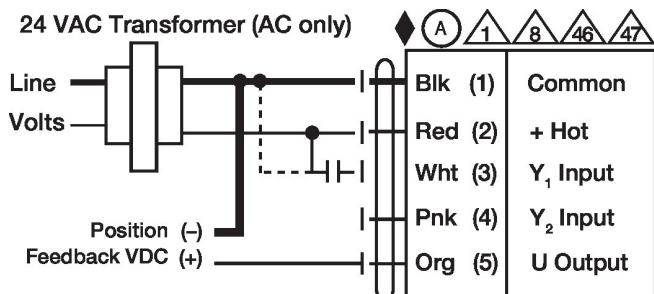
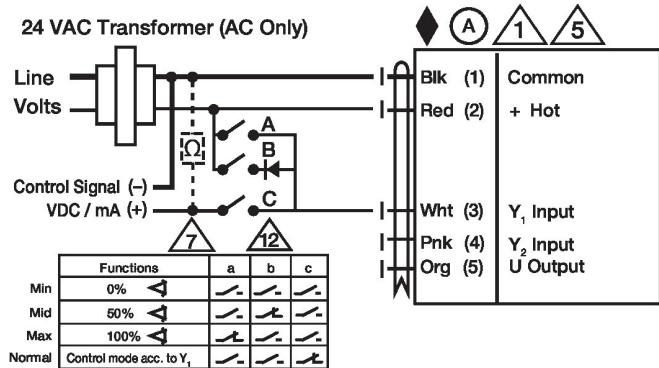
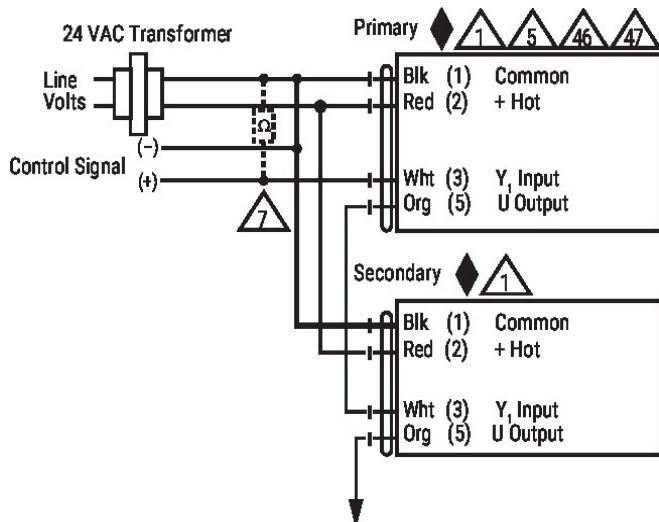


Floating Point



VDC/mA Control

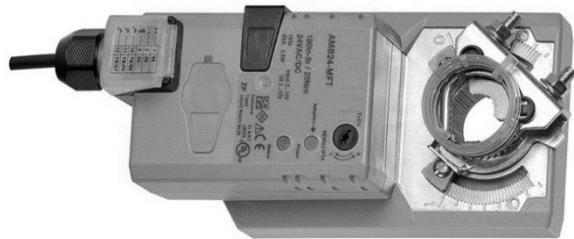


Electrical Installation continued
Dimensions
Wiring Diagrams continued
PWM Control

Override control

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.
Nominal voltage frequency	50/60 Hz	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.
Nominal voltage range	AC 19.2...28.8 V / DC 21.6. V	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.
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
Torque motor	180 in-lb [20 Nm]	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.
Operating range Y	2...10 V	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.
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	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.
Operating range Y variable	Start point 0.5...30 V End point 2.5...32 V	Add-on auxiliary switches are easily fastened directly onto the actuator body for signaling and switching functions.
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	

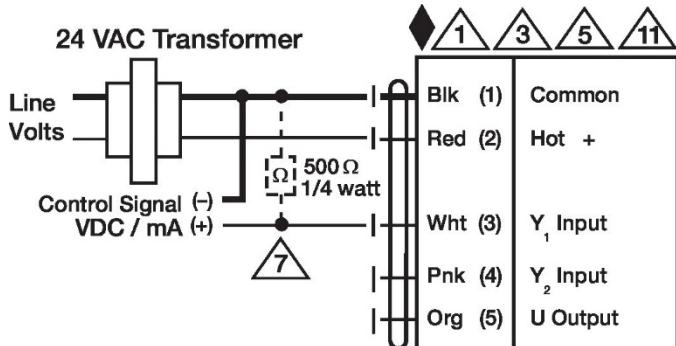
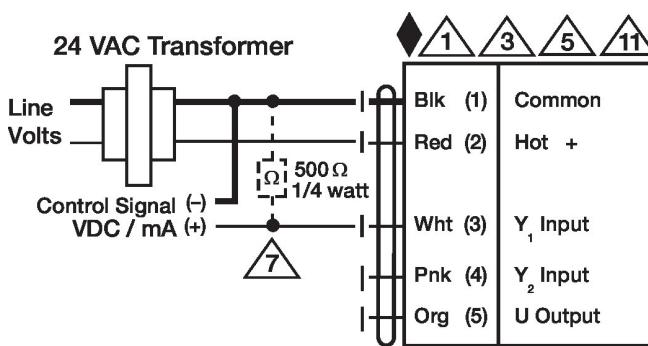
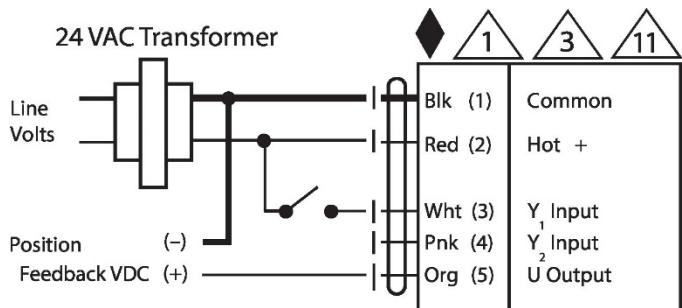
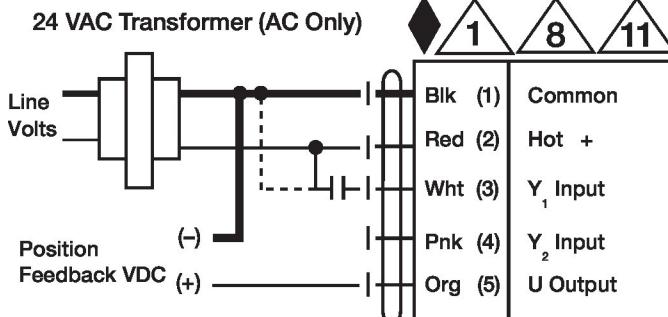
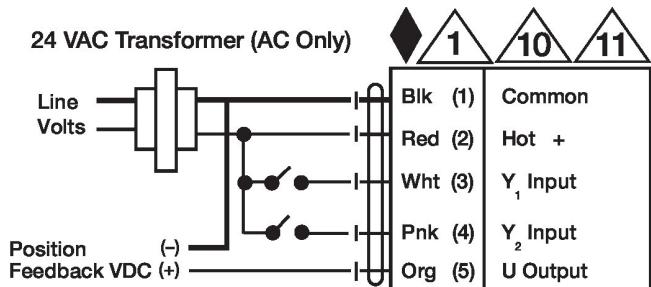
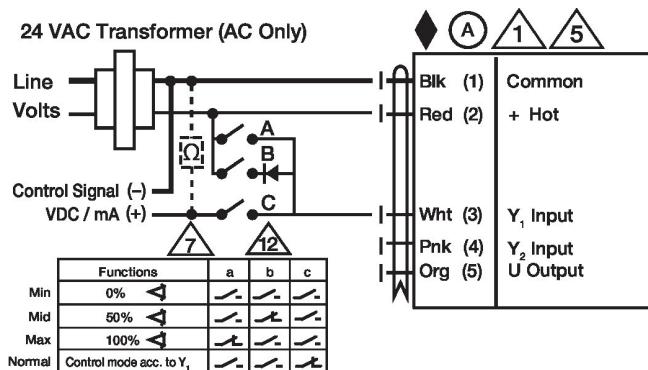
Functional data cont.		Product data cont.
Noise level, motor	45 dB(A)	
Position indication	Mechanical, 30...65 mm stroke	
Weight	2.5 lb [1.2 kg]	
Housing material	UL94-5VA	
Safety data		Typical specification
Power source UL	Class 2 Supply	Modulating control damper actuators shall be electronic direct-coupled type, which require no crank arm and linkage and be capable of direct mounting to a shaft up to 3/4" diameter.
Degree of protection IEC/EN	IP54	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.
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

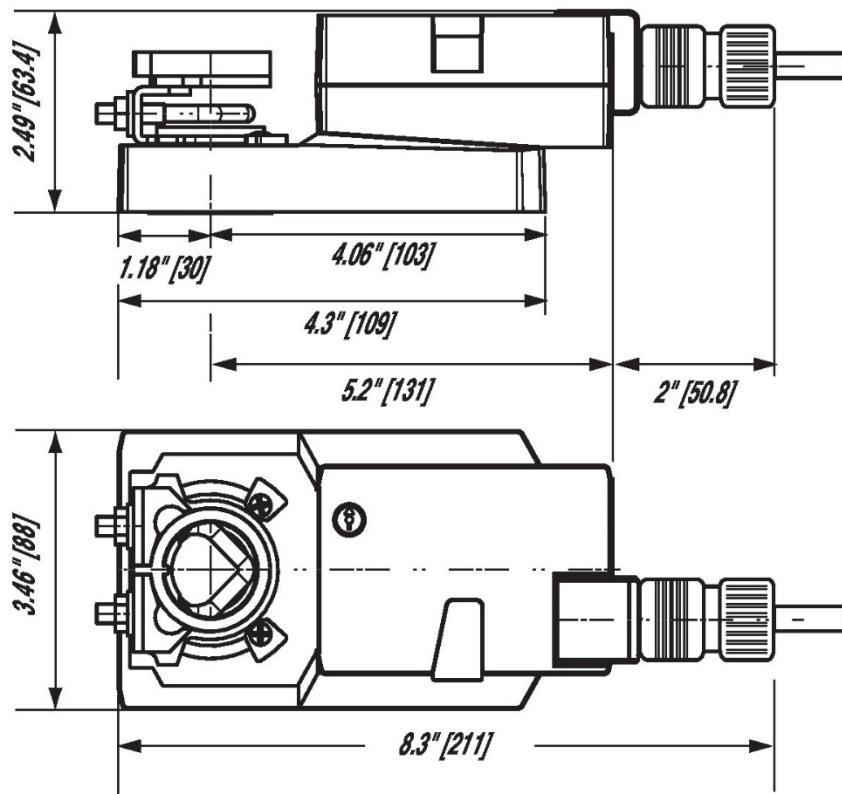
- A** Actuators with appliance cables are numbered.
- 1** Provide overload protection and disconnect as required.
- 3** Actuators may also be powered by DC 24 V.
- 5** Only connect common to negative (-) leg of control circuits.
- 7** A 500 Ω resistor (ZG-R01) converts the 4...20 mA control signal to 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

\emptyset 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
Nominal voltage frequency	50/60 Hz	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 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	Application
Overload Protection	electronic throughout 0...95° rotation	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.
Electrical Protection	actuators are double insulated	
Functional data		Operation
Torque motor	360 in-lb [40 Nm]	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.
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	
Bridging time (PF)	2 s	
Bridging time (PF) variable	0...10 s	

Electrical data cont.		Product Features cont.
Pre-charging time	5...26 s	Typical Specification
Direction of motion motor	selectable with switch 0/1	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.
Direction of motion fail-safe	reversible with switch	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.
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)	Bridging Time
Noise level, fail-safe	61 dB(A)	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.
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		

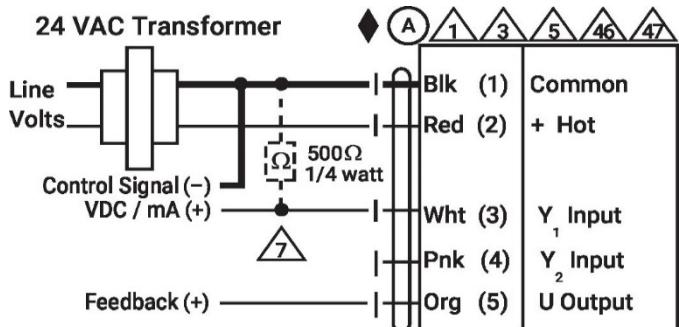
Electrical installation



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.

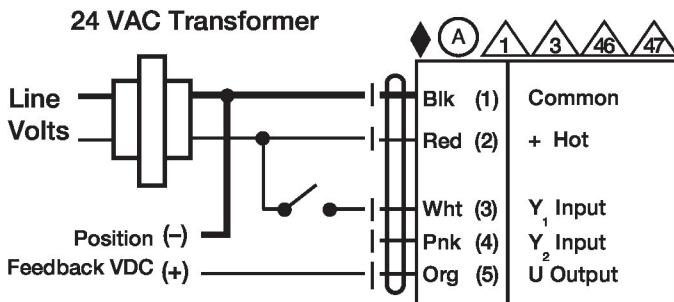
- ◆ Meets cULus requirements without the need of an electrical ground connection.
- ◆ 1 Provide overload protection and disconnect as required.
- ◆ 3 Actuators may also be powered by DC 24 V.
- ◆ 5 Only connect common to negative (-) leg of control circuits.
- ◆ 7 A 500 Ω resistor (ZG-R01) converts the 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

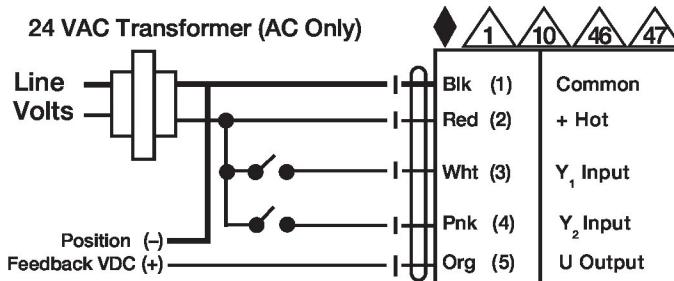


Wiring Diagrams

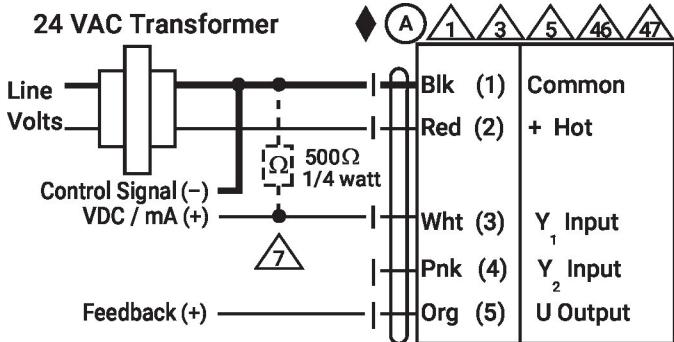
On/Off



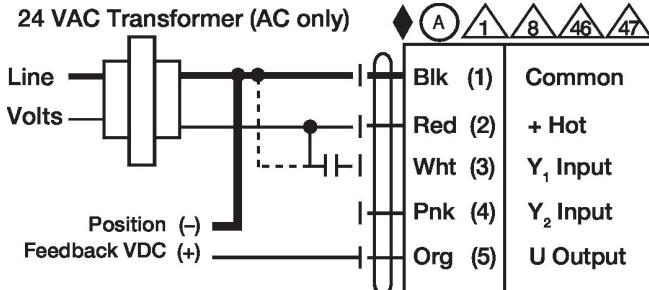
Floating point

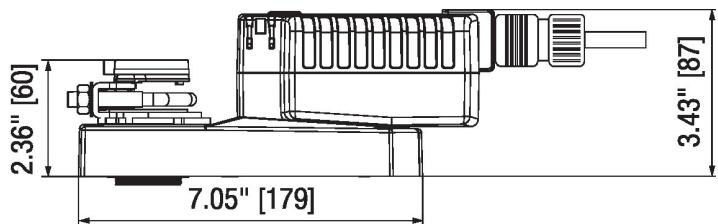
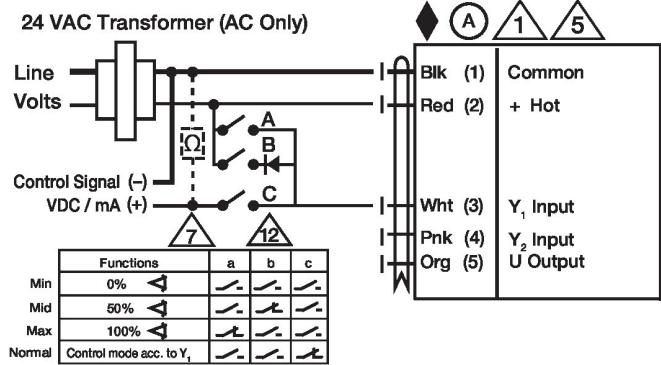
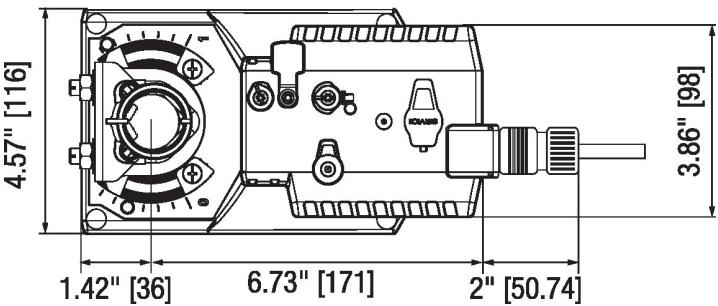
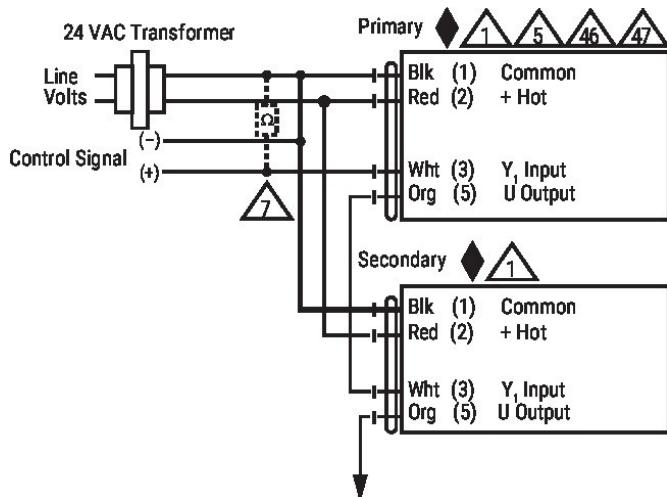


VDC/mA Control



PWM control



Wiring diagrams cont.
Dimensions
Override control

Primary-secondary


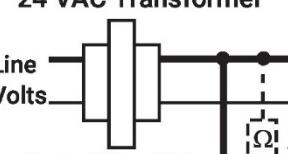
GMB24-MFT Non-Failsafe Multifunction Damper Actuators

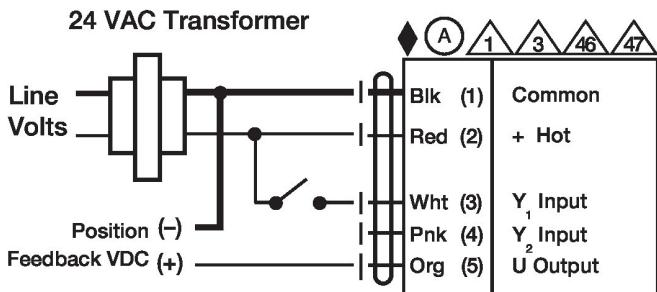
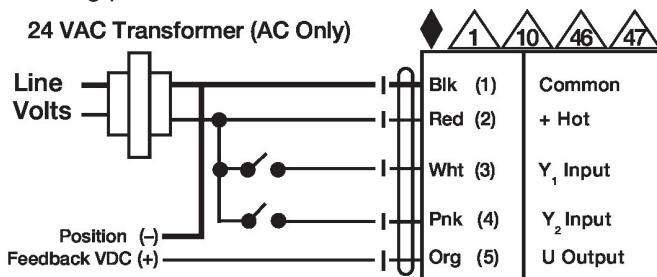
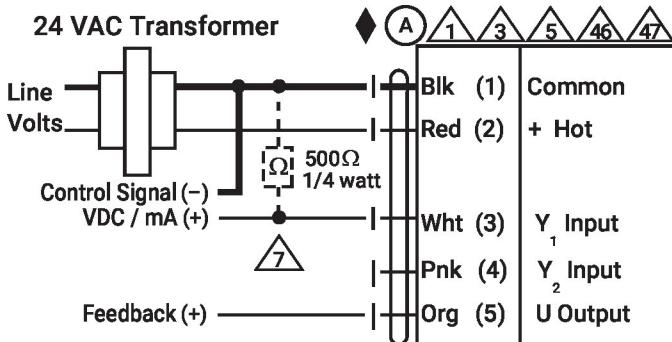
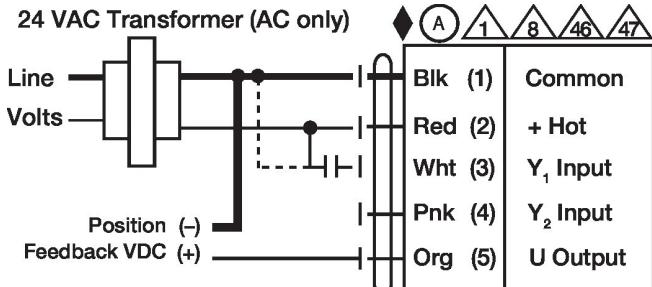
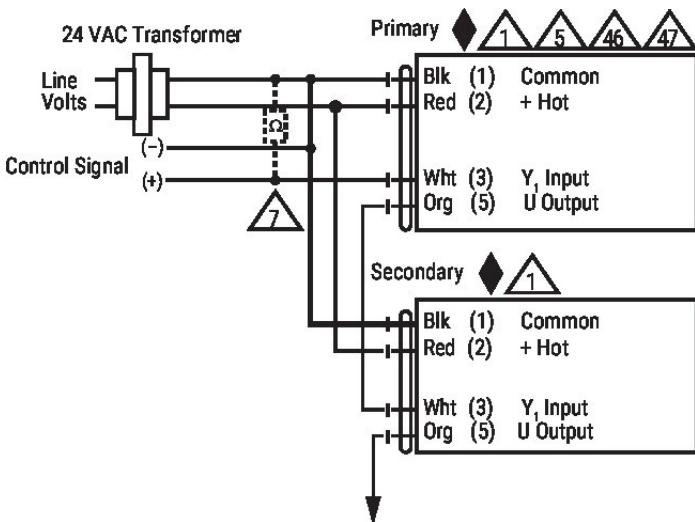
Basic Non Fail-Safe multifunction technology actuator for controlling dampers in typical commercial HVAC applications.

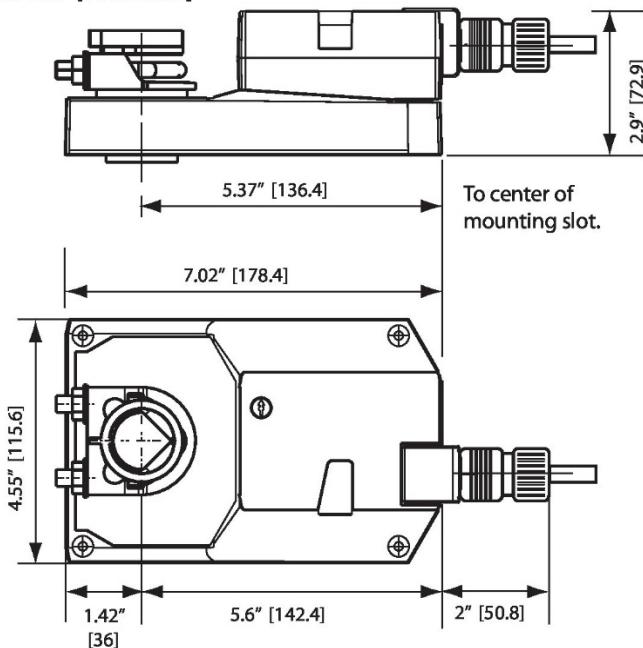
- Torque motor 360 in-lb [40 Nm]
- Nominal voltage AC/DC 24 V
- Control MFT/programmable
- Position feedback 2...10 V



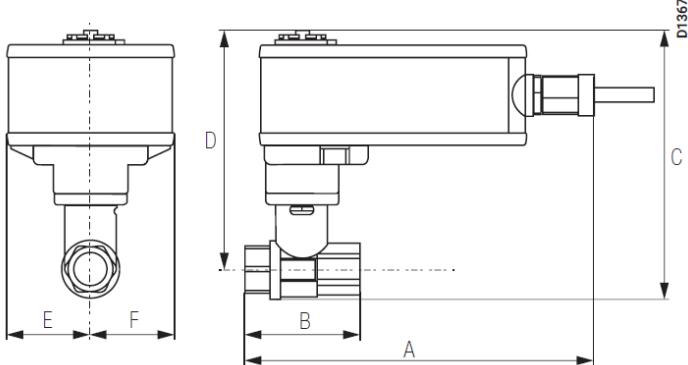
Electrical data		Product features
Nominal voltage	AC/DC 24 V	Application For proportional modulation of dampers in HVAC systems. Actuator sizing should be done in accordance with the damper manufacturer's specifications.
Nominal voltage frequency	50/60 Hz	The actuator is mounted directly to a damper 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.
Nominal voltage range	AC 19.2...28.8 V / DC 21.6. V	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.
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
Torque motor	360 in-lb [40 Nm]	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.
Operating range Y	2...10 V	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.
Operating range Y note	4...20 mA w/ ZG-R01 (500 Ω, 1/4 W resistor)	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.
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	Add-on auxiliary switches are easily fastened directly onto the actuator body for signaling and switching functions.
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			
Power source UL	Class 2 Supply		
Degree of protection IEC/EN	IP54		
Degree of protection NEMA/UL	NEMA 2	Tools ZTH US:..... Service Tool, with ZIP-USB function, for programmable and communicative actuators, VAV controller and HVAC performance devices.	
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.			
Electrical installation			
 A	Actuators with appliance cables are numbered.	 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.	
 1	Provide overload protection and disconnect as required.	 IN4004 or IN4007 diode.	
 3	Actuators may also be powered by DC 24 V.	 Actuators may be controlled in parallel. Current draw and input impedance must be observed.	
 5	Only connect common to negative (-) leg of control circuits.	 Master-Slave wiring required for piggy-back applications. Feedback from Master to control input(s) of Slave(s).	
 7	A 500 Ω resistor (ZG-R01) converts the 4...20 mA control signal to 2...10 V.	VDC/mA Control  Line Volts → 24 VAC Transformer → Common + Hot → Actuator Control Signal (-) → 500 Ω → 1/4 watt → VDC / mA (+) → Actuator Feedback (+) → Actuator → Wht (3) → Pnk (4) → Org (5) → Actuator	
 8	Control signal may be pulsed from either the Hot (Source) or Common (Sink) 24 V line.		

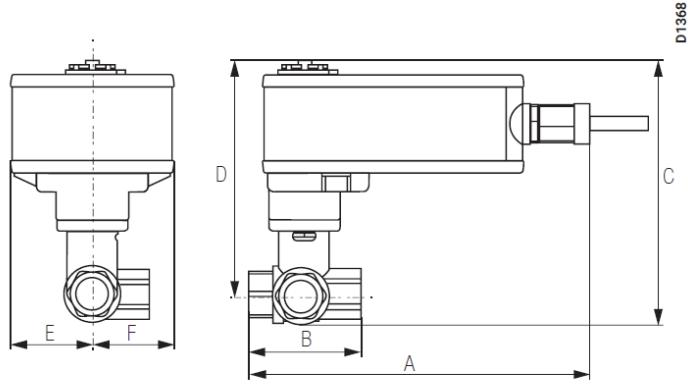
Wiring diagrams
On/Off

Floating point

VDC/mA Control

PWM control

Wiring diagrams cont.
Primary – Secondary

Dimensions
 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

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	1/2"	15	2.41" [61.1]	1.39" [35.2]
B212-B215	1/2"	15	2.38" [60.4]	1.78" [45.2]
B217-B220	3/4"	20	2.73" [69.3]	1.87" [47.4]
B222-B225	1"	25	3.09" [78.4]	1.87" [47.4]
B229-B230	1 1/4"	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	1/2"	15	2.41" [61.1]	1.39" [35.2]	1.20" [30.6]
B312-B315	1/2"	15	2.38" [60.4]	1.78" [45.2]	1.29" [32.8]
B317-B320	3/4"	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]

Technical Data	
Control	MFT
Control signal	2 to 10 VDC
Power consumption	2.5 W
running	
holding	1 W
Transformer sizing	5 VA (class 2 power source)
Electrical connection	1/2" 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 motor
Position indication	reversible with CW/CCW mounting reversible with built-in switch visual indicator
Running time	motor
	150 seconds independent of load (proportional, default)
	<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)	<30 dB(A)
running	
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)

Wiring Diagrams

INSTALLATION NOTES

 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.

 Position feedback cannot be used with Triac sink controller.

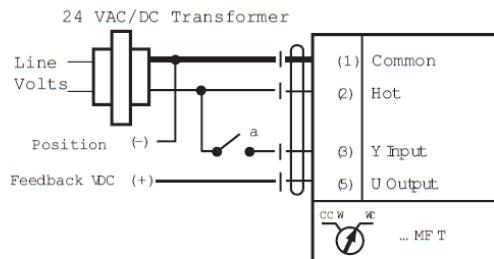
 The actuators internal common reference is not compatible.

APPLICATION NOTES

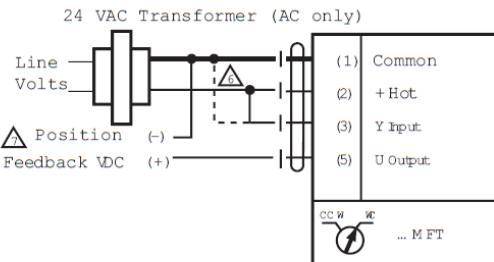
◆ The ZG-R01 500 Ω resistor converts the 4 to 20 mA control signal to 2 to 10 VDC, up to 2 actuators may be connected in parallel.

WARNING Live Electrical Components!

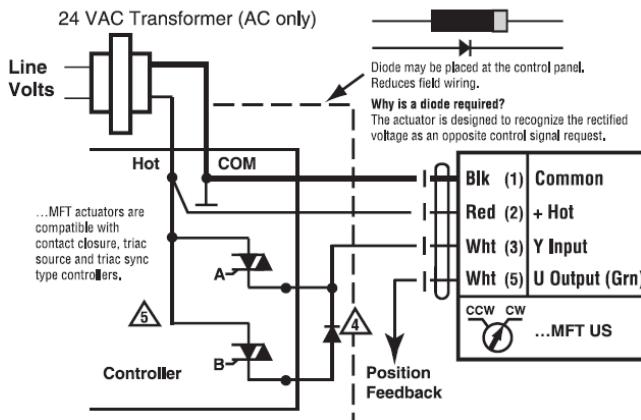
 During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow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



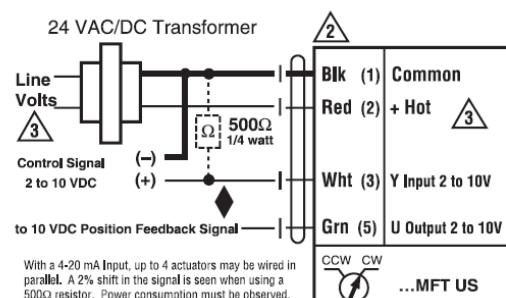
On/Off control



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

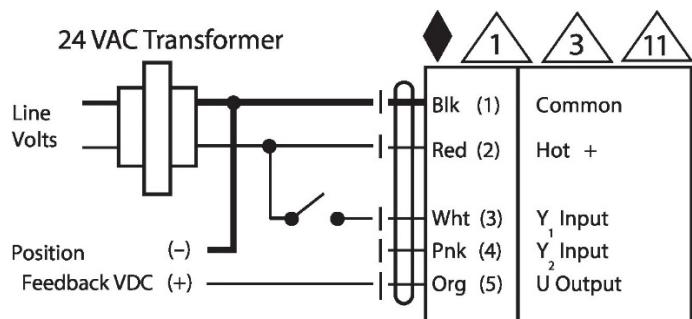
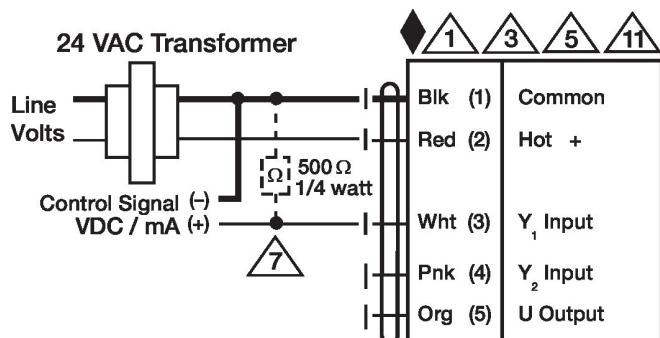
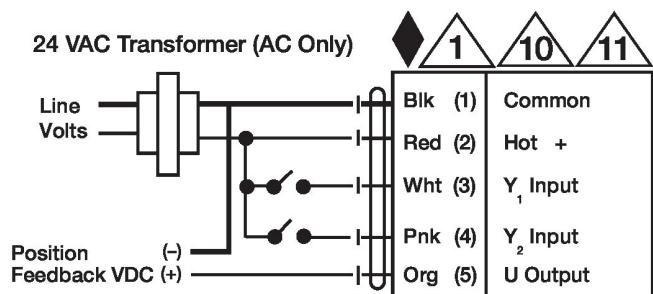
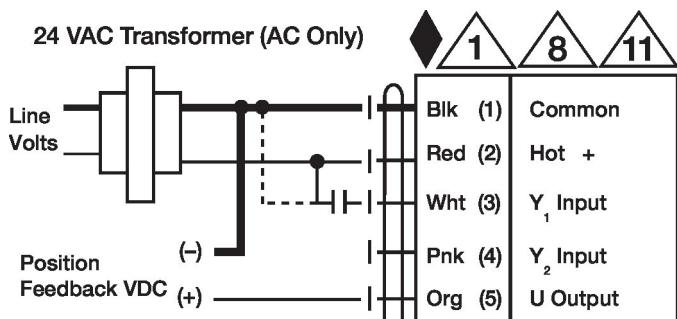
Basic Non Fail-Safe multifunction technology actuator for controlling dampers in typical commercial HVAC applications.

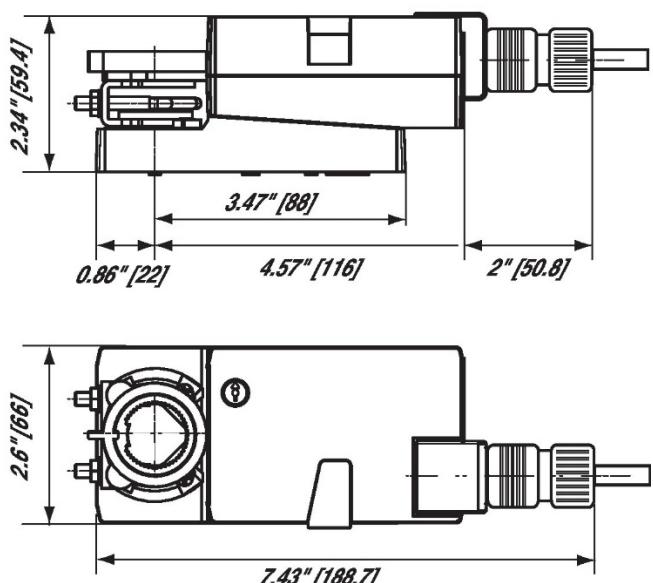
- Torque motor 45 in-lb [5 Nm]
- Nominal voltage AC/DC 24 V
- Control MFT/programmable
- Position feedback 2...10 V



Electrical data		Product features
Nominal voltage	AC/DC 24 V	Application 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.
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		Operation
Torque motor	45 in-lb [5 Nm]	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.
Operating range Y	2...10 V	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.
Operating range Y note	4...20 mA w/ ZG-R01 (500 Ω, 1/4 W resistor)	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.
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	Add-on auxiliary switches are easily fastened directly onto the actuator body for signaling and switching functions.
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)	

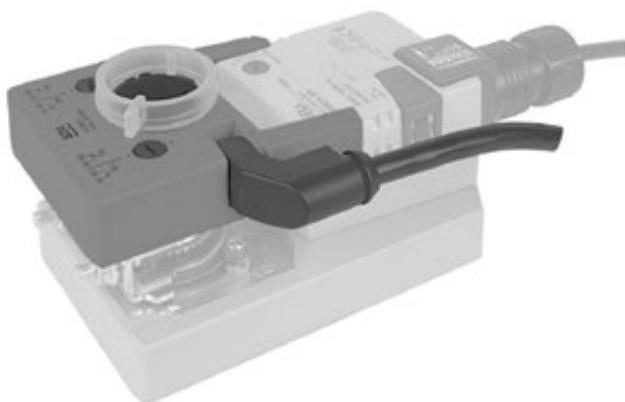
Functional data cont.		Product features cont.	
Position feedback U	2...10 V	Typical specification Proportional control damper actuators shall be electronic direct-coupled type, which require no crank arm and linkage and be capable of direct mounting to a shaft from 1/4" to 5/8" diameter. Actuators must 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 S2A..... Auxiliary switch 2 x SPDT add-on	
Weight	1.3 lb [0.59 kg]		
Housing material	UL94-5VA	Electrical accessories ZTH US Service Tool, with ZIP-USB function, for programmable and communicative actuators, VAV controller and HVAC performance devices	
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		
Ambient humidity	Max. 95% RH, non-condensing		
Ambient temperature	-22...122°F [-30...50°C]	Electrical installation cont. 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.	
Storage temperature	-40...176°F [-40...80°C]		
Servicing	maintenance-free		
Electrical installation cont.			
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.		

Wiring Diagrams

Wiring Diagrams cont.

Dimensions
 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.

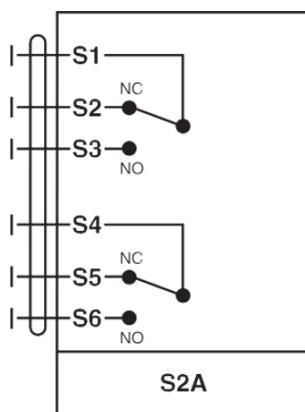
A driver disk is attached to the actuator handle and offers direct transmission of the actuator position to the micro switch cams. The switching points can be set over the full scale of 0 to 1 simply by adjusting the slotted discs

Types

S2A	2 SPDT	3 ft, 18 GA Appliance Cable
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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 9001

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.