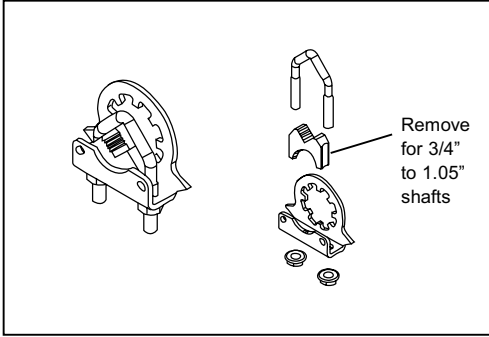


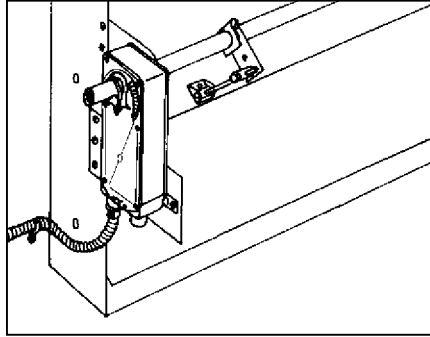
Minimum 133 in-lb torque

- For damper areas up to 35 sq-ft*
(For lower torque, see NF, LF, or TF series)

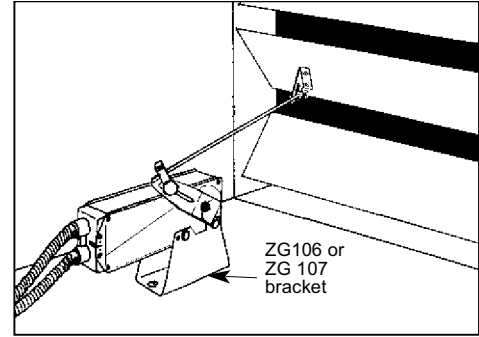
Applications



New standard clamp fits standard 1/2" shafts to 1.05" jackshafts.



Mount directly to 1.05" jackshafts.



Linkage solutions are available when direct coupling is not possible. (See Mounting Methods Guide and Mechanical Accessories Documentation page 132)



AF Series - At A Glance

	AF24 US (p. 20)	AF24-S US (p. 20)	AF120 US (p. 22)	AF230 US (p. 22)	AF230-S US (p. 22)	AF24-SR US (p. 24)	AFA24-SR US (p. 26)	AF24-ECON R03US (p. 28)	AF24-PC US (p. 30)	AF24-MFT US (p. 32)	AF24-MFT-S US (p. 32)	AF24-MFT95 US (p. 34)
Torque:	133 in-lb	●	●	●	●	●	●	●	●	●	●	●
Power supply :	24 VAC/DC	●	●									
	120 VAC			●	●							
	230 VAC					●	●					
Control signal:	on-off	●	●	●	●	●	●					
	2 to 10 VDC							●	●			
	Multi-function**									●	●	
	0 to 135Ω											●
	3kΩ NTC Type 10 thermistor							●				
	0 to 20 V phasecut								●			
Feedback signal:	2 to 10 VDC							●	●	●		
	VDC variable**									●	●	●
Running time motor:	150 sec constant	●	●	●	●	●	●	●	●			
	95 sec constant							●				
	Adj. 75 to 300 sec.***									●	●	●
	spring: <20 sec	●	●	●	●	●	●	●	●	●	●	●
Brushless DC Motor		●	●	●	●	●	●	●	●	●	●	●
External direction of rotation switch								●	●	●	●	●
Manual override		●	●	●	●	●	●	●	●	●	●	●
Appliance rated cable, 18 GA		●	●	●	●	●	●	●	●	●	●	●
Built-in auxiliary switch 2 SPDT		●		●		●			●			

Installation instructions(p. 36–41)
Electrical operations(p. 42)

General wiring(p. 43)

Start-up and checkout (p. 44)

*Based on 4 in-lb/ft² damper torque loading. Parallel blade. No edge seals. **Default 2 to 10 VDC. ***Default 150 seconds.

AF24 (-S) US

On-off, Spring Return Fail-Safe, 24 V



Technical Data	AF24 (-S) US
Power supply	24 VAC \pm 20% 50/60 Hz 24 VDC \pm 10%
Power consumption	running: 5 W; holding: 1.5 W
Transformer sizing	10 VA (class 2 power source)
Electrical connection	3 ft, 18 GA appliance cable 1/2" conduit connector
Electrical protection	auxiliary switches are double insulated
Overload protection	electronic throughout 0° to 95° rotation
Angle of rotation	95°, adjustable 35 to 95° w/ ZDB-AF2
Torque	133 in-lb [15 Nm] constant
Direction of rotation	reversible with CW/CCW mounting
Position indication	visual indicator, 0° to 95° (0° is spring return position)
Manual override	3mm hex crank (shipped w/actuator)
Auxiliary switches	2 x SPDT 7A (2.5A) @ 250 VAC, UL listed one set at +5°, one adjustable 25° to 85°
Running time	150 sec. constant, independent of load, spring return < 20 sec
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 type 2 / IP54
Housing material	zinc coated steel
Agency listings	UL 873 listed, CSA C22.2 No. 24 certified
Noise level	max. 45 dB (A)
Servicing	maintenance free
Quality standard	ISO 9001
Weight	6.0 lbs (2.7 kg)

Torque min. 133 in-lb, for control of air dampers

Application

For on-off, fail-safe control of dampers in HVAC systems. Actuator sizing should be done in accordance with the damper manufacturer's specifications. Control is on-off from an auxiliary contact, or a manual switch.

The actuator is mounted directly to a damper shaft up to 1.05" in diameter by means of its universal clamp. A crankarm and several mounting brackets are available for applications where the actuator cannot be direct coupled to the damper shaft.

Operation

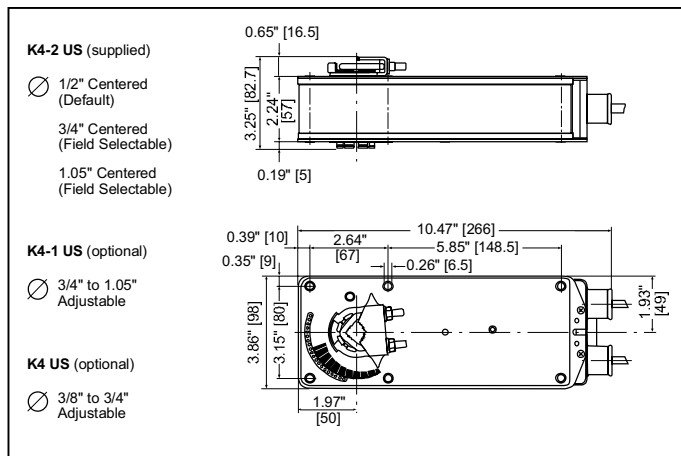
The AF series actuators provide true spring return operation for reliable fail-safe application and positive close off on air tight dampers. The spring return system provides consistent torque to the damper with, and without, power applied to the actuator.

The AF series provide 95° of rotation and are provided with a graduated position indicator showing 0° to 95°. The AF has a unique manual positioning mechanism which allows the setting of any damper position within its 95° of rotation. The AF series actuators are shipped at +5° (5° from full fail-safe) to provide automatic compression against damper gaskets for tight shut-off. When power is applied to the AF series, the manual mechanism is released. The actuators will now try to close against the 0° position during its normal control operations. The manual override can also be released physically by the use of a crank supplied with the actuator.

The AF uses 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 function to prevent damage to the actuator in a stall condition. The actuator may be stalled anywhere in its normal rotation without the need of mechanical end switches.

The AF24-S US version is provided with 2 built in auxiliary switches. These SPDT switches are provided for safety interfacing or signaling, for example, for fan start-up. The switching function at the fail-safe position is fixed at +5°, the other switch function is adjustable between +25° to +85°.

Dimensions [All numbers in brackets are in millimeters.]



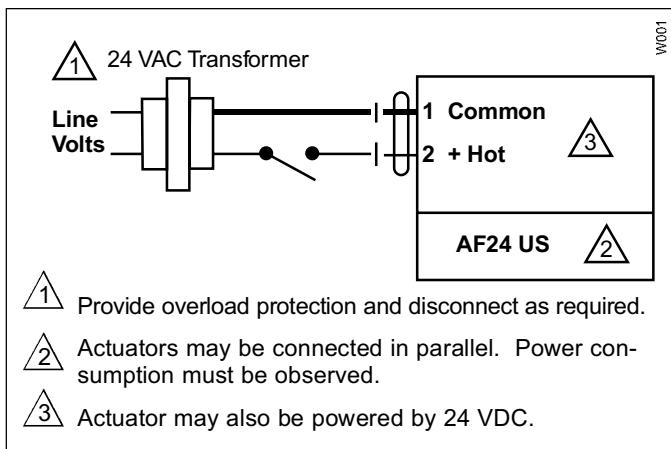
Accessories

AV 10-18	Shaft extension
IND-AF2	Damper position indicator
K4 US	Universal clamp for 3/8" to 3/4" shafts
K4-1 US	Universal clamp for up to 1.05" dia jackshafts
K4-H	Universal clamp for hexshafts 3/8" to 5/8"
KH-AF	Crankarm for up to 3/4" round shaft (Series 2)
KH-AF-1	Crankarm for up to 1.05" jackshaft (Series 2)
KH-AFV	V-bolt kit for KH-AF and KH-AF-1
Tool-06	8mm and 10 mm wrench
ZG-HTR	Thermostat/Heater Kit
ZDB-AF2	Angle of rotation limiter
ZG-100	Universal mounting bracket
ZG-101	Universal mounting bracket
ZG-102	Multiple actuator mounting bracket
ZG-106	Mounting bracket for Honeywell® Mod IV replacement or new crankarm type installations
ZG-107	Mounting bracket for Honeywell® Mod III or Johnson® Series 100 replacement or new crankarm type installations
ZG-108	Mounting bracket for Barber Colman® MA 3../4.., Honeywell® Mod III or IV or Johnson® Series 100 replacement or new crankarm type installations
ZG-AF US	Crankarm adaptor kit for AF/NF
ZG-AF108	Crankarm adaptor kit for AF/NF
ZS-100	Weather shield (metal)
ZS-150	Weather shield (polycarbonate)
ZS-260	Explosion-proof housing
ZS-300	NEMA 4X housing

Note: When using AF24 US and AF24-S US actuators, only use accessories listed on this page.

For Actuator Wiring Information and Diagrams, Please See Belimo Wiring Guide (pg 349).

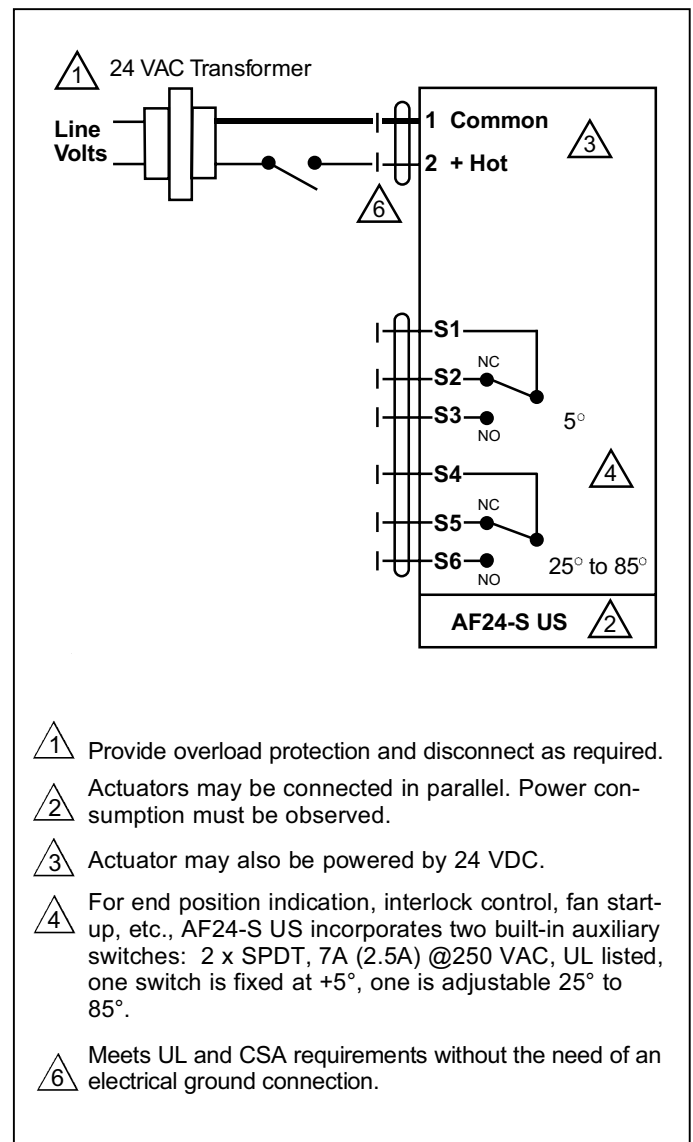
Wiring Diagrams



On-off wiring for AF24 US

AF24 (-S) US Typical Specification

On-off spring return damper actuators shall be direct coupled type which require no crankarm and linkage and be capable of direct mounting to a jackshaft up to a 1.05" diameter. The actuators must be designed so that they may be used for either clockwise or counterclockwise fail-safe operation. Actuators shall have a manual positioning mechanism accessible on its cover. Actuators shall use a brushless DC motor and be protected from overload at all angles of rotation. Run time shall be constant and independent of torque. If required, 2 SPDT auxiliary switches shall be provided with one switch having the capability of being adjustable. Actuators with switches must be constructed to meet the requirement for Double Insulation so an electrical ground connection is not required to meet agency listings. Actuators shall be UL listed and CSA certified, have a 5 year warranty, and be manufactured under ISO 9001 International Quality Control Standards. Actuators shall be as manufactured by Belimo.



On-off wiring for AF24-S US

AF120 (-S) US, AF230 (-S) US

On-off, Spring Return Fail-Safe, 120 or 230 VAC



Technical Data	AF120 (-S) US	AF230 (-S) US
Power supply	120 VAC \pm 10% 50/60 Hz	230 VAC \pm 14% 50/60 Hz
Power consumption	running: 6 W holding: 2.3 W	6.5 W 2.5 W
Transformer sizing	10 VA	11 VA
Electrical connection	3 ft, 18 GA appliance cable 1/2" conduit connector	
Electrical protection	actuators are double insulated	
Overload protection	electronic throughout 0° to 95° rotation	
Angle of rotation	95°, adjustable 35 to 95° w/ ZDB-AF2	
Torque	133 in-lb [15 Nm] constant	
Direction of rotation	reversible with CW/CCW mounting	
Position indication	visual indicator, 0° to 95° (0° is spring return position)	
Manual override	3mm hex crank (shipped w/actuator)	
Auxiliary switches (AF120/230-S)	2 x SPDT 7A (2.5A) @ 250 VAC, UL listed one set at +5°, one adjustable 25° to 85°	
Running time	150 sec. constant, independent of load, spring return < 20 sec	
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 type 2 / IP54	
Housing material	zinc coated steel	
Agency listings	UL 873 listed, CSA C22.2 No. 24 certified	
Noise level	max. 45 dB (A)	
Servicing	maintenance free	
Quality standard	ISO 9001	
Weight	6.9 lbs (3.1 kg)	

Torque min. 133 in-lb, for control of air dampers

Application

For on-off, fail-safe control of dampers in HVAC systems. Actuator sizing should be done in accordance with the damper manufacturer's specifications. Control is on-off from an auxiliary contact, or a manual switch.

The actuator is mounted directly to a damper shaft up to 1.05" in diameter by means of its universal clamp. A crankarm and several mounting brackets are available for applications where the actuator cannot be direct coupled to the damper shaft.

Operation

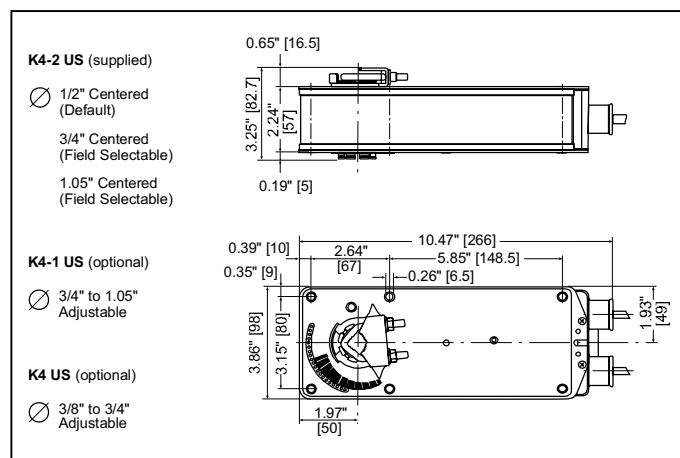
The AF series actuators provide true spring return operation for reliable fail-safe application and positive close off on air tight dampers. The spring return system provides consistent torque to the damper with, and without, power applied to the actuator.

The AF series provide 95° of rotation and are provided with a graduated position indicator showing 0° to 95°. The AF has a unique manual positioning mechanism which allows the setting of any damper position within its 95° of rotation. The AF series actuators are shipped at +5° (5° from full fail-safe) to provide automatic compression against damper gaskets for tight shut-off. When power is applied to the AF series, the manual mechanism is released. The actuators will now try to close against the 0° position during its normal control operations. The manual override can also be released physically by the use of a crank supplied with the actuator.

The AF uses 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 function to prevent damage to the actuator in a stall condition. The actuator may be stalled anywhere in its normal rotation without the need of mechanical end switches. The actuators are Double Insulated so a ground connection is not required.

The AF120/230-S us version is provided with 2 built-in auxiliary switches. These SPDT switches are provided for safety interfacing or signaling, for example, for fan start-up. The switching function at the fail-safe position is fixed at +5°, the other switch function is adjustable between +25° to +85°.

Dimensions [All numbers in brackets are in millimeters.]



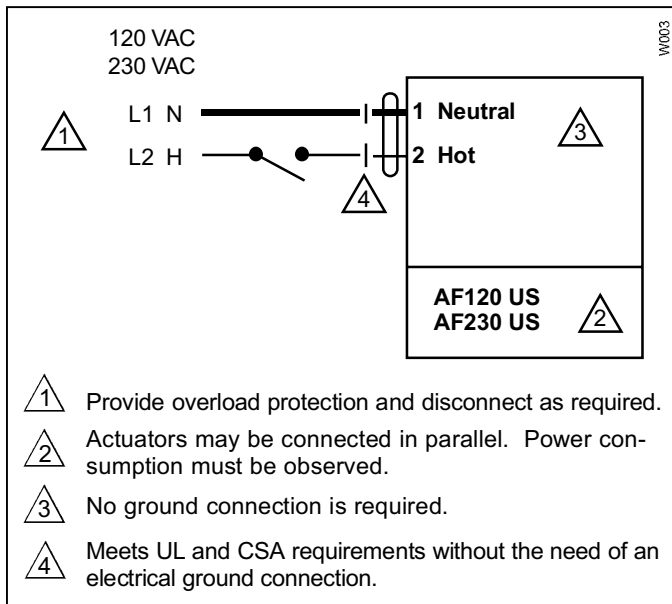
Accessories

AV 10-18	Shaft extension
IND-AF2	Damper position indicator
K4 US	Universal clamp for 3/8" to 3/4" shafts
K4-1 US	Universal clamp for up to 1.05" dia jackshafts
KH-AF	Crankarm for up to 3/4" round shaft (Series 2)
KH-AF-1	Crankarm for up to 1.05" jackshaft (Series 2)
KH-AFV	V-bolt kit for KH-AF and KH-AF-1
Tool-06	8mm and 10 mm wrench
ZG-HTR	Thermostat/Heater Kit
ZDB-AF2	Angle of rotation limiter
ZG-100	Universal mounting bracket
ZG-101	Universal mounting bracket
ZG-102	Multiple actuator mounting bracket
ZG-106	Mounting bracket for Honeywell® Mod IV replacement or new crankarm type installations
ZG-107	Mounting bracket for Honeywell® Mod III or Johnson® Series 100 replacement or new crankarm type installations
ZG-108	Mounting bracket for Barber Colman® MA 3../4..., Honeywell® Mod III or IV or Johnson® Series 100 replacement or new crankarm type installations
ZG-AF US	Crankarm adaptor kit for AF/NF
ZG-AF108	Crankarm adaptor kit for AF/NF
ZS-100	Weather shield (metal)
ZS-150	Weather shield (polycarbonate)
ZS-260	Explosion-proof housing
ZS-300	NEMA 4X housing

Note: When using AF120/230 US and AF120/230-S US actuators, only use accessories listed on this page.

For Actuator Wiring Information and Diagrams, Please See Belimo Wiring Guide (pg 349).

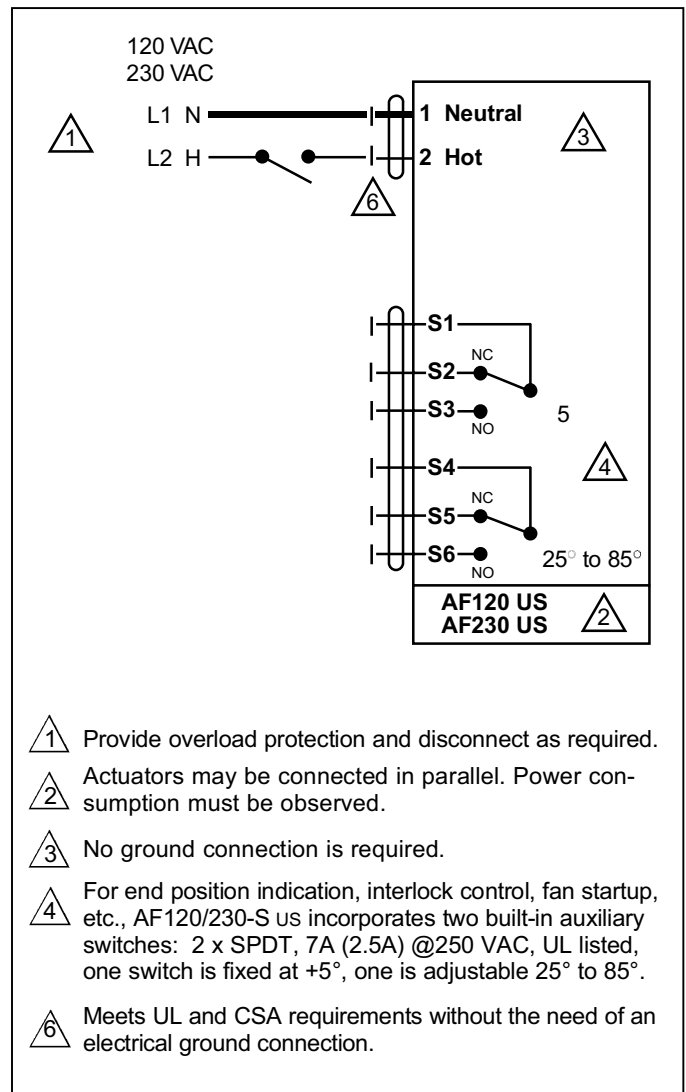
Wiring Diagrams



On-off wiring for AF120 US and AF230 US

AF120 US, AF230 US Typical Specification

On-off spring return damper actuators shall be direct coupled type which require no crankarm and linkage and be capable of direct mounting to a jackshaft up to a 1.05" diameter. The actuators must be designed so that they may be used for either clockwise or counterclockwise fail-safe operation. Actuators shall have a manual positioning mechanism accessible on its cover. Actuators shall use a brushless DC motor and be protected from overload at all angles of rotation. Run time shall be constant and independent of torque. If required, 2 SPDT auxiliary switches shall be provided with one switch having the capability of being adjustable. Actuators must be constructed to meet the requirement for Double Insulation so an electrical ground connection is not required to meet agency listings. Actuators shall be UL listed and CSA certified, have a 5 year warranty, and be manufactured under ISO 9001 International Quality Control Standards. Actuators shall be as manufactured by Belimo.



On-off wiring for AF120-S US and AF230-S US

AF24-SR US



Proportional Damper Actuator, Spring Return Fail-Safe, 24 V for 2 to 10 VDC and 4 to 20 mA Control Signal.
Output Signal of 2 to 10 VDC for Position Indication



Technical Data	AF24-SR US
Power supply	24 VAC \pm 20% 50/60 Hz 24 VDC \pm 10%
Power consumption	running: 6 W ; holding: 2 W
Transformer sizing	10 VA (class 2 power source)
Electrical connection	3 ft, 18 GA appliance cable 1/2" conduit connector
Overload protection	electronic throughout 0 to 95° rotation
Operating range Y	2 to 10 VDC, 4 to 20 mA
Input impedance	100 k (0.1 mA), 500 Ω
Feedback output U	2 to 10 VDC (max. 0.5 mA) for 95°
Angle of rotation	mechanically limited to 95°
Torque	133 in-lb [15 Nm] constant
Direction of rotation	spring: reversible with cw/ccw mounting motor: reversible with built-in switch
Position indication	visual indicator, 0° to 95° (0° is spring return position)
Manual override	3mm hex crank (shipped w/actuator)
Running time	150 sec. constant, independent of load, spring return < 20 sec
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 type 2 / IP54
Housing material	zinc coated metal
Agency listings	UL 873 listed, CSA C22.2 No. 24 certified
Noise level	max. 45 dB (A)
Servicing	maintenance free
Quality standard	ISO 9001
Weight	6.0 lbs (2.7 kg)

Torque min. 133 in-lb, for control of air dampers

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 crankarm and several mounting brackets are available for applications where the actuator cannot be direct coupled to the damper shaft.

The actuator operates in response to a 2 to 10 VDC, with the addition of a 500 Ω resistor, a 4 to 20 mA control input from an electronic controller or positioner. A 2 to 10 VDC feedback signal is provided for position indication or master-slave applications.

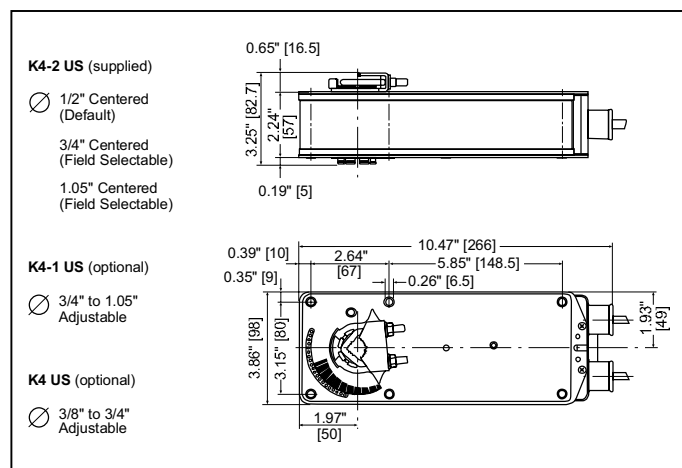
Operation

The AF series actuators provide true spring return operation for reliable fail-safe application and positive close-off on air tight dampers. The spring return system provides constant torque to the damper with, and without, power applied to the actuator.

The AF series provides 95° of rotation and is provided with a graduated position indicator showing 0 to 95°. The AF has a unique manual positioning mechanism which allows the setting of any damper position within its 95° of rotation. The actuator is shipped at +5° position (5° from full fail-safe) to provide automatic compression against damper gaskets for tight shut-off. When power is applied, the manual mechanism is released and the actuator drives toward the full fail-safe position. The actuator will memorize the angle where it stops rotating and use this point for its zero position for its normal control operations. The manual override can also be released physically by the use of a crank supplied with the actuator.

The AF 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 actuator's exact zero position. The ASIC monitors and controls the brushless DC motor's rotation and provides a digital rotation sensing function to prevent damage to the actuator in a stall condition. The actuator may be stalled anywhere in its normal rotation without the need of mechanical end switches.

Dimensions [All numbers in brackets are in millimeters.]



Proportional Damper Actuator, Spring Return Fail-Safe, 24 V for 2 to 10 VDC and 4 to 20 mA Control Signal. Output Signal of 2 to 10 VDC for Position Indication

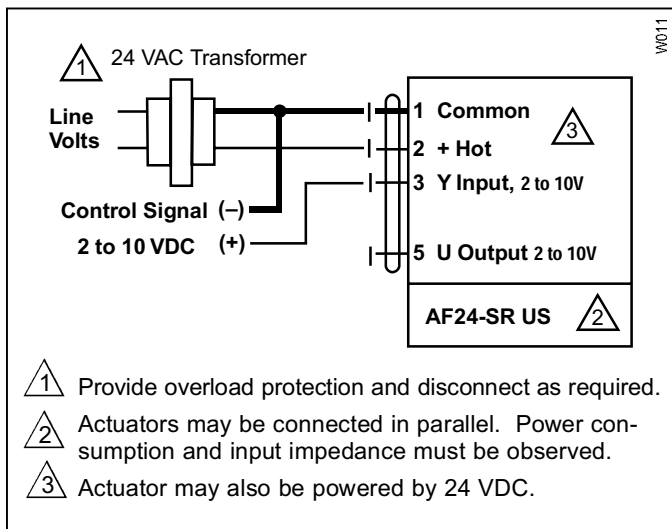
Accessories

AV 10-18	Shaft extension
IND-AF2	Damper position indicator
K4 US	Universal clamp for 3/8" to 3/4" shafts
K4-1 US	Universal clamp for up to 1.05" dia jackshafts
K4-H	Universal clamp for hexshafts 3/8" to 5/8"
KH-AF	Crankarm for up to 3/4" round shaft (Series 2)
KH-AF-1	Crankarm for up to 1.05" jackshaft (Series 2)
KH-AFV	V-bolt kit for KH-AF and KH-AF-1
Tool-06	8mm and 10 mm wrench
SGA24	Min. and/or man. positioner in NEMA 4 housing
SGF24	Min. and/or man. positioner for flush panel mounting
ZG-R01	500 resistor for 4 to 20 mA control signal
ZG-HTR	Thermostat/Heater Kit
ZDB-AF2	Angle of rotation limiter
ZG-100	Universal mounting bracket
ZG-101	Universal mounting bracket
ZG-102	Multiple actuator mounting bracket
ZG-103	Universal mounting bracket
ZG-104	Universal mounting bracket
ZG-106	Mounting bracket for Honeywell® Mod IV replacement or new crankarm type installations
ZG-107	Mounting bracket for Honeywell® Mod III or Johnson® Series 100 replacement or new crankarm type installations
ZG-108	Mounting bracket for Barber Colman® MA 3../4.., Honeywell® Mod III or IV or Johnson® Series 100 replacement or new crankarm type installations
ZG-AF US	Crankarm adaptor kit for AF/NF
ZG-AF108	Crankarm adaptor kit for AF/NF
ZS-100	Weather shield (metal)
ZS-150	Weather shield (polycarbonate)
ZS-260	Explosion-proof housing
ZS-300	NEMA 4X housing

Note: When using AF24-SR US actuators, only use accessories listed on this page.

For Actuator Wiring Information and Diagrams, Please See Belimo Wiring Guide (pg 349).

Wiring Diagrams



AF24-SR US Typical Specification

Spring return control damper actuators shall be direct coupled type which require no crankarm and linkage and be capable of direct mounting to a jackshaft up to a 1.05" diameter. The actuator must provide proportional 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 counterclockwise fail-safe operation. Actuators shall have control direction of rotation switch accessible on its cover. 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 master-slave applications. Actuators shall be UL listed and CSA certified, have a 5 year warranty, and be manufactured under ISO 9001 International Quality Control Standards. Actuators shall be as manufactured by Belimo.

