ZG-JSL, ZG-JSLA Jackshaft Retrofit Linkage

For AF, NF, LF, NMX and AMX Series Actuators

5 YEAR WARRANTY

Application

The ZG-JSL jackshaft linkage is designed to easily attach to any part of a jackshaft and allow easy installation of select Belimo actuators.

The unique open ended design and clamp insert allows the ZG-JSL to be used with any jackshaft from ½" to ¾" in diameter. Removal of the insert will allow the linkage to attach to a maximum shaft diameter of 1.05". Changing the anti-rotation plate will allow various actuators to be mounted.

Default/Configuration

The ZG-JSL linkage can also be configured by moving the anti-rotation plate 90° for space saving applications. See mounting configurations below. The ZG-JSLA will have a factory mounted actuator on the linkage in the vertical position only.

Operation

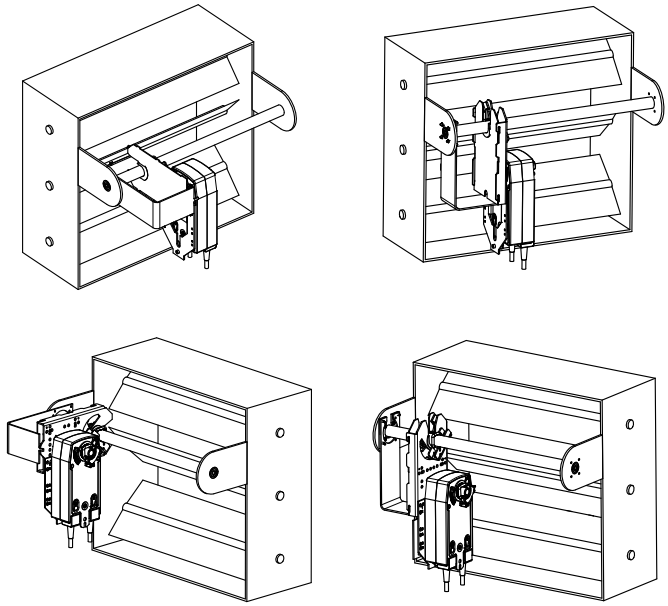
The ¾" diameter built-in steel shaft allows direct coupling to the Belimo series actuators in the chart below. There is a torque reduction when using the ZG-JSL linkage. Verify application requirements before use.

Technical Data	ZG-JSL, ZG-JSLA
Fits shaft diameter	½" to ¾" with insert, 1.05" without insert
Materials:	
Housing	galvanized steel
Bearings	GF Delrin
Shafts	steel
Max torque output	90% of rated actuator torque
Max actuator yield	see chart on right
Mech. angle of rotation	90° mountable
Ambient temperature	-22°F to 122°F [-33°C to 50°C]
Storage temperature	-40°F to 176°F [148.9°C to 80°C]
Weight	3.25 lbs [1.47 kg]

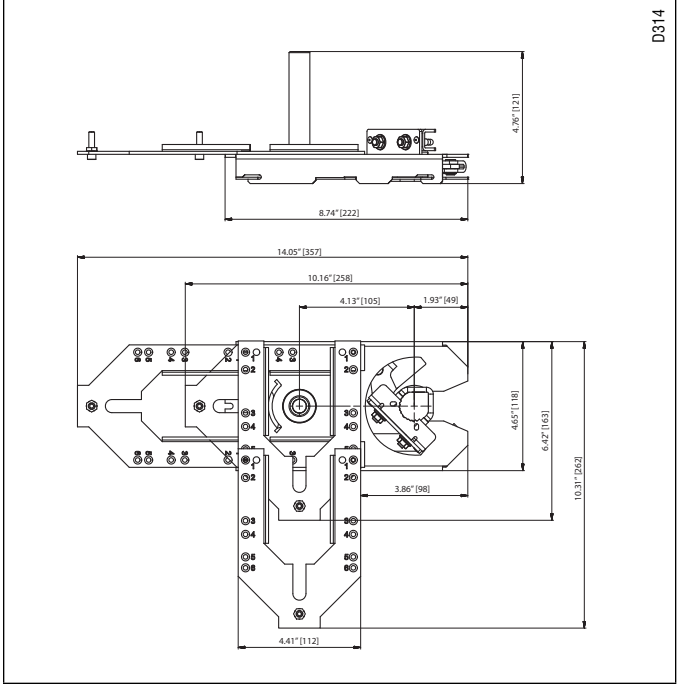
Actuator*	Torque Reduction
AF Series	123 in-lbs
AFX Series	166 in-lbs
NFX Series	87 in-lbs
LF Series	33 in-lbs
NMX Series	87 in-lbs
AMX Series	166 in-lbs

* GM/GK series pending approval.

Mounting Configurations



Dimensions (Inches [mm])



LF24(-S) US

On/Off, Spring Return, 24V

Torque min. 35 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, digital output, or a manual switch.

The actuator is mounted directly to a damper shaft from 3/8" up to 1/2" in diameter by means of its universal clamp, 1/2" shaft centered at delivery. For shafts up to 3/4" use K6-1 accessory. A crank arm and several mounting brackets are available for applications where the actuator cannot be direct coupled to the damper shaft.

Operation

The LF 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.

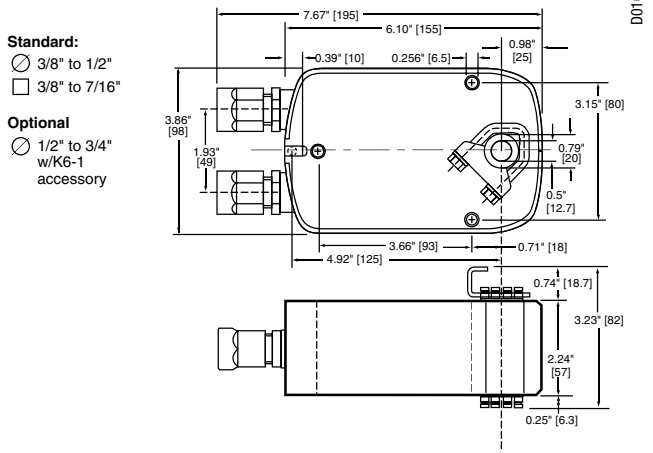
The LF series provides 95° of rotation and is provided with a graduated position indicator showing 0° to 95°.

The actuator may be stalled anywhere in its normal rotation without the need of mechanical end switches. Power consumption is reduced in holding mode.

The LF24-S US version is provided with one built in auxiliary switch. This SPDT switch is provided for safety interfacing or signaling, for example, for fan start-up. The switching function is adjustable between 0° and 95°. The auxiliary switch in the LF24-S is double insulated so an electrical ground connection is not necessary.

Technical Data		LF24(-S) US
Power supply		24 VAC ± 20% 50/60 Hz 24 VDC ± 10%
Power consumption	running	5 W
	holding	2.5 W
Transformer sizing		7 VA (class 2 power source)
Electrical connection (LF24-S US has 2 cables)		3 ft, 18 GA appliance cable 1/2" conduit connector
Overload protection		electronic throughout 0 to 95° rotation
Angle of rotation		max. 95°, adjust. with mechanical stop
Torque		35 in-lb [4 Nm]
Direction of rotation		reversible with cw/ccw mounting
Position indication		visual indicator, 0° to 95° (0° is spring return position)
Running time	motor	< 40 to 75 sec
(nominal)	spring	< 25 sec @-4°F to 122°F [-20°C to 50°C] < 60 sec @-22°F [-30°C]
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		cULus acc. to UL 873 and CAN/CSA C22.2 No. 24-93
Noise level (max)	running	< 50 db (A)
	spring return	62 dB (A)
Servicing		maintenance free
Quality standard		ISO 9001
Weight	LF24	3.1 lbs (1.40 kg)
	LF24-S	3.2 lbs (1.45 kg)
LF24-S US		
Auxiliary switch		1 x SPDT 3A (0.5A) @ 250 VAC, UL Approved adjustable 0° to 95° (double insulated)

Dimensions (Inches [mm])



Accessories

AV 10-18	Shaft extension (K6-1 is required)
IND-LF	Damper position indicator
K6-1	Universal clamp for up to 3/4" diameter shafts
KH-LF	Crank arm for up to 1/2" round shaft
Tool-06	8mm and 10 mm wrench
ZG-LF2	Crank arm adaptor kit for LF
ZG-112	Mounting bracket for Honeywell Mod IV, M6415 type actuators, and new installations
ZG-LF112	Crank arm adaptor kit for Honeywell Mod IV, M6415 type actuators, and new installations
ZS-100	Weather shield (metal)
ZS-150	Weather shield (polycarbonate)
ZS-260	Explosion-proof housing

NOTE: When using LF24 US and LF24-S US actuators, only use accessories listed on this page.
For actuator wiring information and diagrams, refer to Belimo Wiring Guide.

Typical Specification

On/Off spring return damper actuators shall be direct coupled type which require no crank arm and linkage and be capable of direct mounting to a shaft up to a 3/4" diameter and center a 1/2" shaft. The actuators must be designed so that they may be used for either clockwise or counterclockwise fail-safe operation. Actuators shall be protected from overload at all angles of rotation. If required, one SPDT auxiliary switch shall be provided having the capability of being adjustable. Actuators with auxiliary switch 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, have a 5 year warranty, and be manufactured under ISO 9001 International Quality Control Standards. Actuators shall be as manufactured by Belimo.

Wiring Diagrams

INSTALLATION NOTES

1 Provide overload protection and disconnect as required.

2 ***CAUTION** Equipment Damage!*
Actuators may be connected in parallel.
Power consumption and input impedance must be observed.

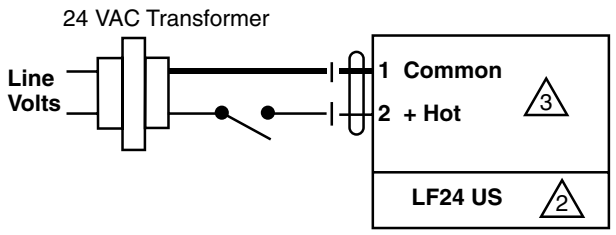
3 Actuators may also be powered by 24 VDC.

4 For end position indication, interlock control, fan startup, etc., LF24-S US incorporates a built-in auxiliary switch: 1 x SPDT, 3A (0.5A) @250 VAC, UL Approved, adjustable 0° to 95°.

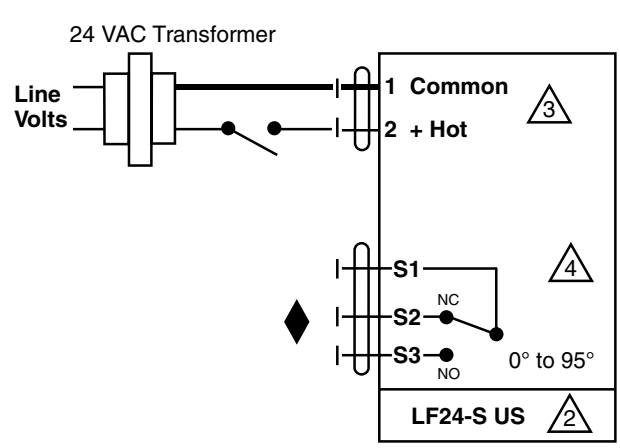
APPLICATION NOTES

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

***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 wiring for LF24 US



On/Off wiring for LF24-S US

LF120(-S) US / LF230(-S) US

On/Off, Spring Return, 120/230 VAC

Torque min. 35 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 from 3/8" up to 1/2" in diameter by means of its universal clamp, 1/2" shaft centered at delivery. For shafts up to 3/4" use K6-1 accessory. A crank arm and several mounting brackets are available for applications where the actuator cannot be direct coupled to the damper shaft.

Operation

The LF 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 LF series provides 95° of rotation and is provided with a graduated position indicator showing 0° to 95°.

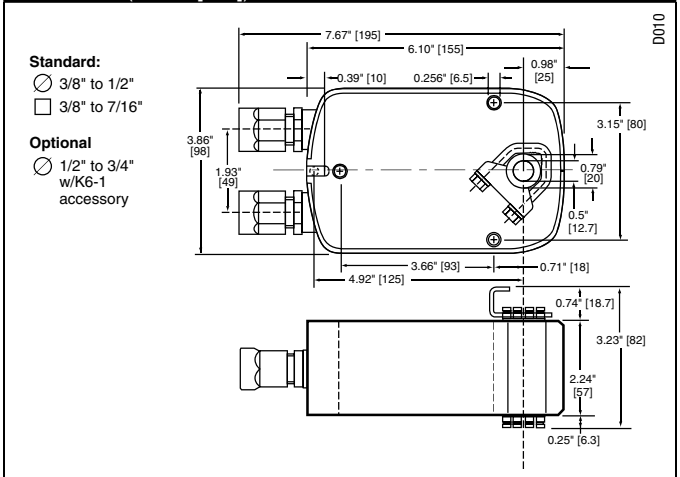
The actuator may be stalled anywhere in its normal rotation without the need of mechanical end switches. Power consumption is reduced in holding mode. The actuator is double insulated so an electrical ground connection is not necessary.

The LF120-S US and LF230-S US versions are provided with one built-in auxiliary switch. This SPDT switch is provided for safety interfacing or signaling, for example, for fan start-up. The switching function is adjustable between 0° and 95°.

Technical Data		LF120(-S) US / LF230(-S) US
Power supply	LF120(-S) US	120 VAC ± 10% 50/60 Hz
	LF230(-S) US	230 VAC ± 10% 50/60 Hz
Power consumption		
LF120(-S) US	running	5.5 W
	holding	3.5 W
LF230(-S) US	running	5 W
	holding	3 W
Transformer sizing		
LF120(-S) US		7.5 VA
LF230(-S) US		7 VA
Electrical connection (-S models have 2 cables)		3 ft, 18 GA appliance cable 1/2" conduit connector
Overload protection		electronic throughout 0 to 95° rotation
Electrical protection		actuators are double insulated
Angle of rotation		max 95°, adjust. with mechanical stop
Torque		35 in-lb [4 Nm] constant torque
Direction of rotation		reversible with cw/ccw mounting
Position indication		visual indicator, 0° to 95° (0° is spring return position)
Electrical protection		actuators are double insulated
Running time (nominal)	motor	< 40 to 75 sec
	spring	< 25 sec @-4°F to 122°F [-20°C to 50°C] < 60 sec @-22°F [-30°C]
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		cULus acc. to UL 873 and CAN/CSA C22.2 No. 24-93
Noise level (max)	running	< 50 db (A)
	spring return	62 dB (A)
Servicing		maintenance free
Quality standard		ISO 9001
Weight	LF120/230	3.4 lbs (1.54 kg)
	LF120/230-S	3.5 lbs (1.60 kg)

LF120-S US / LF230-S US	
Auxiliary switch	1 x SPDT 3A (0.5A) @ 250 VAC, UL Approved adjustable 0° to 95°

Dimensions (Inches [mm])



Accessories

AV 10-18	Shaft extension (K6-1 is required)
IND-LF	Damper position indicator
K6-1	Universal clamp for up to 3/4" diameter shafts
KH-LF	Crank arm for up to 1/2" round shaft
Tool-06	8mm and 10 mm wrench
ZG-LF2	Crank arm adaptor kit for LF
ZG-112	Mounting bracket for Honeywell Mod IV, M6415 type actuators, and new installations
ZG-LF112	Crank arm adaptor kit for Honeywell Mod IV, M6415 type actuators, and new installations
ZS-100	Weather shield (metal)
ZS-150	Weather shield (polycarbonate)
ZS-260	Explosion-proof housing

NOTE: When using LF120/230 US & LF120-S/230-S US actuators, only use accessories listed on this page.
For actuator wiring information and diagrams, refer to Belimo Wiring Guide.

Typical Specification

On/Off spring return damper actuators shall be direct coupled type which require no crank arm and linkage and be capable of direct mounting to a shaft up to a 3/4" diameter and center a 1/2" shaft. The actuators must be designed so that they may be used for either clockwise or counterclockwise fail-safe operation. Actuators shall be protected from overload at all angles of rotation. If required, one SPDT auxiliary switch shall be provided having the capability of being adjustable. Actuators 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, have a 5 year warranty, and be manufactured under ISO 9001 International Quality Control Standards. Actuators shall be as manufactured by Belimo.

Wiring Diagrams

INSTALLATION NOTES

1 Provide overload protection and disconnect as required.

2 ***CAUTION** Equipment Damage!*
Actuators may be connected in parallel.
Power consumption and input impedance must be observed.

3 No ground connection is required.

4 For end position indication, interlock control, fan startup, etc., LF120-S US and LF230-S US incorporate one built-in auxiliary switch: 1 x SPDT, 3A (0.5A) @250 VAC, UL Approved, adjustable 0° to 95°.

APPLICATION NOTES

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

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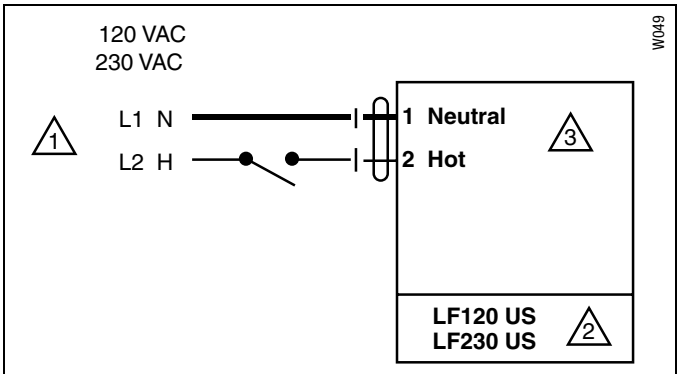
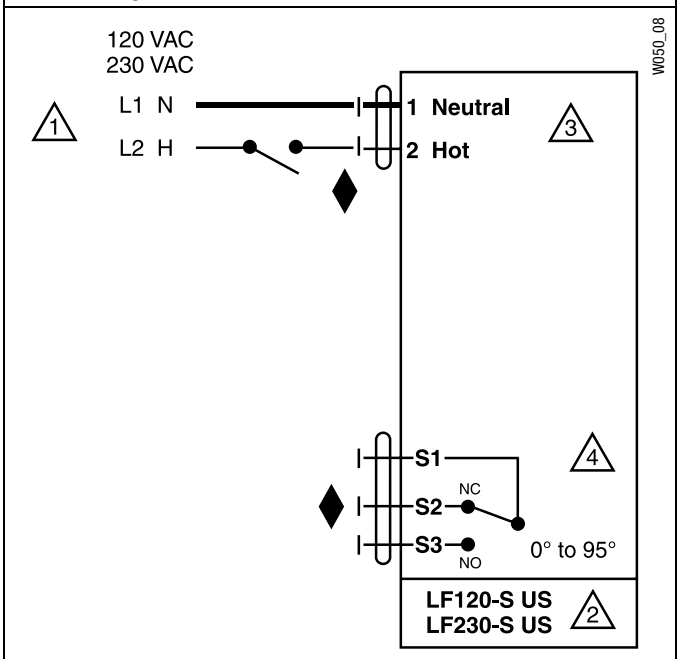


On/Off wiring for LF120 US / LF230 US



On/Off wiring for LF120-S US / LF230-S US

LF24-3(-S) US

On/Off, Floating Point, Spring Return, 24V

Torque min. 35 in-lb, for control of air dampers

Application

For modulation or On/Off control 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 3/8" up to 1/2" in diameter by means of its universal clamp, 1/2" shaft centered at delivery. For shafts up to 3/4" use K6-1 accessory. A crank arm and several mounting brackets are available for applications where the actuator cannot be direct coupled to the damper shaft.

Control is floating point from a triac or relay, or On/Off from an auxiliary contact from a fan motor contactor, controller, or manual switch.

Operation

The LF 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 LF series provides 95° of rotation and is provided with a graduated position indicator showing 0 to 95°.

The LF24-3 (-S) US 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. 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.

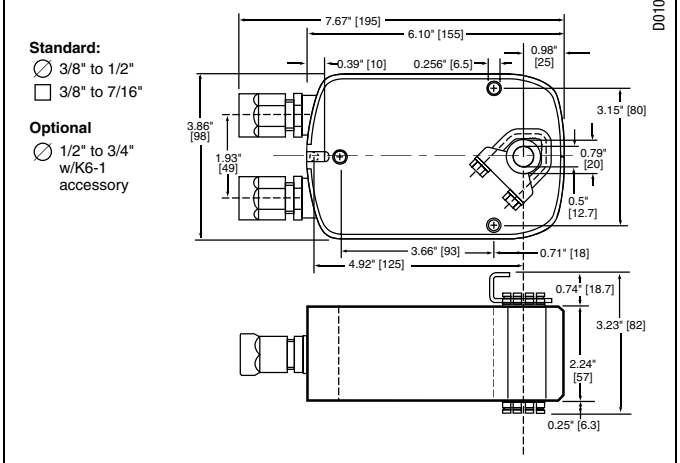
Power consumption is reduced in holding mode.

The LF24-3-S US version is provided with one built-in auxiliary switch. This SPDT switch is provided for safety interfacing or signaling, for example, for fan start-up. The switching function is adjustable between 0° and 95°. The auxiliary switch in the LF24-3-S US is double insulated so an electrical ground is not necessary.

Technical Data		LF24-3(-S) US
Power supply		24 VAC ± 20% 50/60 Hz 24 VDC ± 10%
Power consumption		
	running	2.5 W
	holding	1 W
Transformer sizing		5 VA (class 2 power source)
Electrical connection		
LF24-3 US		3 ft, plenum rated cable 1/2" conduit connector
LF24-3-S US		3 ft, 18 GA appliance cables (2) 1/2" conduit connectors
Overload protection		electronic throughout 0 to 95° rotation
Input impedance		1000 Ω (0.6w) control inputs
Angle of rotation		max. 95°, adjust. with mechanical stop
Torque		35 in-lb [4 Nm]
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)
Running time	motor	150 sec constant, independent of load
	spring	< 25 sec @-4°F to 122°F [-20°C to 50°C] < 60 sec @-22°F [-30°C]
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		cULus acc. to UL 873 and CAN/CSA C22.2 No. 24-93
Noise level (max)	running	< 30 db (A)
Servicing		maintenance free
Quality standard		ISO 9001
Weight	LF24-3	3.1 lbs (1.40 kg)
	LF24-3-S	3.6 lbs (1.45 kg)

LF24-3-S US	
Auxiliary switch	1 x SPDT 3A (0.5A) @ 250 VAC, UL Approved adjustable 0° to 95° (double insulated)

Dimensions (Inches [mm])



Accessories	
AV 10-18	Shaft extension (K6-1 is required)
IND-LF	Damper position indicator
K6-1	Universal clamp for up to 3/4" diameter shafts
KH-LF	Crank arm for up to 1/2" round shaft
Tool-06	8mm and 10 mm wrench
ZG-LF2	Crank arm adaptor kit for LF
ZG-112	Mounting bracket for Honeywell Mod IV, M6415 type actuators, and new installations
ZG-LF112	Crank arm adaptor kit for Honeywell Mod IV, M6415 type actuators, and new installations
ZS-100	Weather shield (metal)
ZS-150	Weather shield (polycarbonate)
ZS-260	Explosion-proof housing

NOTE: When using LF24-3 (-S) US actuators, only use accessories listed on this page.

For actuator wiring information and diagrams, refer to Belimo Wiring Guide.

Typical Specification

Floating point, On/Off spring return damper actuators shall be direct coupled type which require no crank arm and linkage and be capable of direct mounting to a shaft up to a 3/4" diameter and center a 1/2" shaft. The actuators must be designed so that they may be used for either clockwise or counterclockwise fail-safe operation. Actuators shall have an external direction of rotation switch to reverse control logic. Actuators shall use a brushless DC motor and be protected from overload at all angles of rotation. If required, one SPDT auxiliary switch shall be provided having the capability of being adjustable. Actuators with auxiliary switch must be constructed to meet the requirements for Double Insulation so an electrical ground is not required to meet agency listings. Run time shall be constant and independent of torque. Actuators shall be cULus listed, have a 5 year warranty, and be manufactured under ISO 9001 International Quality Control Standards. Actuators shall be as manufactured by Belimo.

Wiring Diagrams

INSTALLATION NOTES

1 Provide overload protection and disconnect as required.

2 ***CAUTION** Equipment Damage!*
Actuators may be connected in parallel.
Power consumption and input impedance must be observed.

3 Actuators may also be powered by 24 VDC.

4 The Common connection from the actuator must be connected to the Hot connection of the controller.

5 The actuator Hot must be connected to the control board Common.

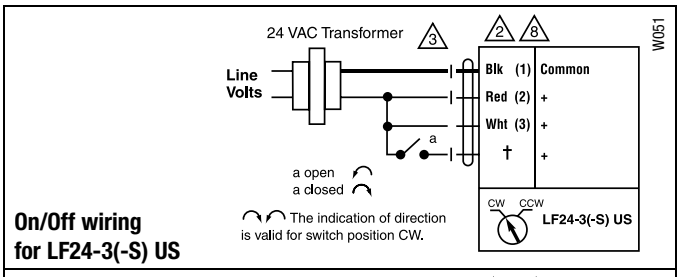
6 For end position indication, interlock control, fan startup, etc., LF24-3-S US LF120-S US and LF230-S US incorporate one built-in auxiliary switch: 1 x SPDT, 3A (0.5A) @250 VAC, UL Approved, adjustable 0° to 95°.

8 Actuators with plenum rated cable do not have numbers on wires; use color coded instead. Actuators with appliance rated cable use numbers.
† LF24-3 US, Green wire #4, LF24-3-S US, White wire #5

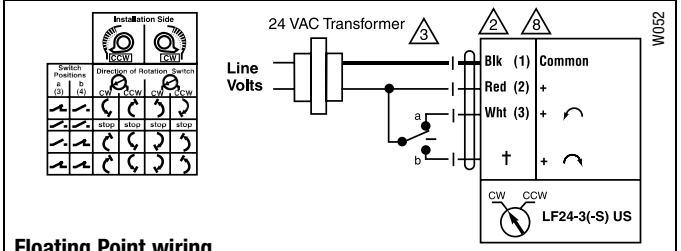
APPLICATION NOTES

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

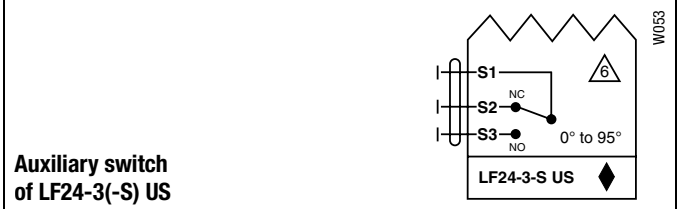
***WARNING** Live Electrical Components!*
During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components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



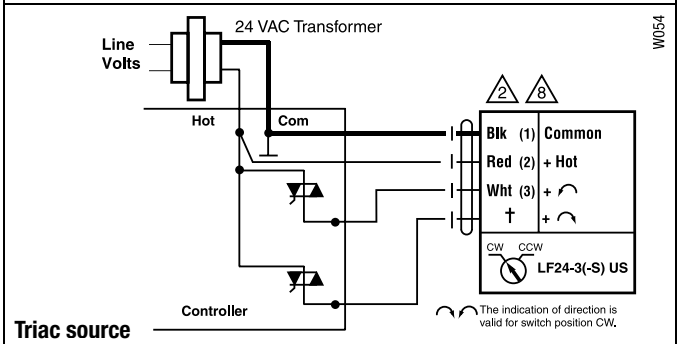
On/Off wiring for LF24-3(-S) US



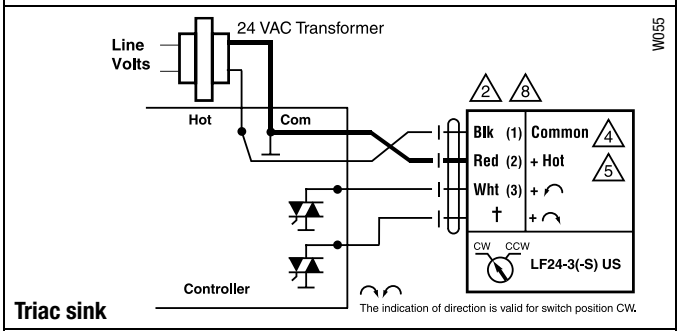
Floating Point wiring for LF24-3(-S) US



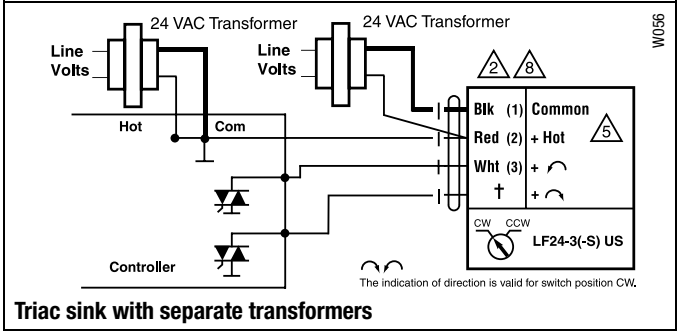
Auxiliary switch of LF24-3(-S) US



Triac source



Triac sink



Triac sink with separate transformers

LF24-SR(-S) US

Proportional, Spring Return, 24 V for 2 to 10 VDC or 4 to 20 mA Control Signal

Torque min. 35 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 from 3/8" up to 1/2" in diameter by means of its universal clamp, 1/2" shaft centered at delivery. For shafts up to 3/4" use K6-1 accessory. A crank arm 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, or with the addition of a 500W 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 LF 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 LF series provides 95° of rotation and is provided with a graduated position indicator showing 0 to 95°.

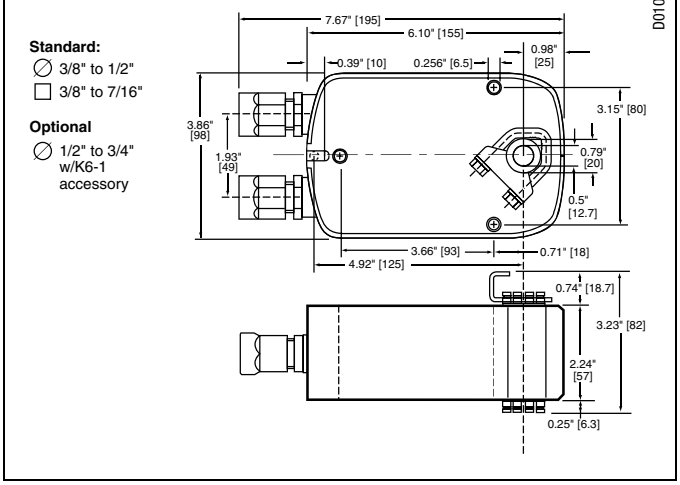
The LF24-SR (-S) US uses a brushless DC motor which is controlled by an Application Specific Integrated Circuit (ASIC) and a microprocessor. The microprocessor provides the intelligence to the ASIC to provide a constant rotation rate and to know the actuator's exact fail-safe position. The ASIC monitors 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. Power consumption is reduced in holding mode.

The LF24-SR-S US version is provided with one built-in auxiliary switch. This SPDT switch is provided for safety interfacing or signaling, for example, for fan start-up. The switching function is adjustable between 0° and 95°. The auxiliary switch in the LF24-SR-S US is double insulated so an electrical ground in not necessary.

Technical Data		LF24-SR(-S) US
Power supply		24 VAC ± 20% 50/60 Hz 24 VDC ± 10%
Power consumption		
	running	2.5 W
	holding	1 W
Transformer sizing		5 VA (class 2 power source)
Electrical connection		
LF24-SR US		3 ft, plenum rated cable 1/2" conduit connector
LF24-SR-S US		3 ft, 18 GA appliance cables (2) 1/2" conduit connectors
Overload protection		electronic throughout 0 to 95° rotation
Input impedance		100 kΩ (0.1 mA), 500 Ω
Angle of rotation		max. 95°, adjust. with mechanical stop
Torque		35 in-lb [4 Nm]
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)
Running time	motor	150 sec constant, independent of load
(nominal)	spring	< 25 sec @-4°F to 122°F [-20°C to 50°C] < 60 sec @-22°F [-30°C]
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		cULus acc. to UL 873 and CAN/CSA C22.2 No. 24-93
Noise level (max)	running	< 30 db (A)
	spring return	62 dB (A)
Servicing		maintenance free
Quality standard		ISO 9001
Weight	LF24-SR US	3.1 lbs (1.40 kg)
	LF24-SR-S US	3.2 lbs (1.45 kg)

LF24-SR-S US	
Auxiliary switch	1 x SPDT 3A (0.5A) @ 250 VAC, UL Approved adjustable 0° to 95° (double insulated)

Dimensions (Inches [mm])



Accessories	
AV 10-18	Shaft extension (K6-1 is required)
IND-LF	Damper position indicator
K6-1	Universal clamp for up to 3/4" diameter shafts
KH-LF	Crank arm for up to 1/2" round shaft
SGA24	Min. and/or man. positioner in NEMA 4 housing
SGF24	Min. and/or man. positioner for flush panel mounting
Tool-06	8mm and 10 mm wrench
ZG-LF2	Crank arm adaptor kit for LF
ZG-112	Mounting bracket for Honeywell Mod IV, M6415 type actuators, and new installations
ZG-LF112	Crank arm adaptor kit for Honeywell Mod IV, M6415 type actuators, and new installations
ZG-R01	500 Ω resistor for 4 to 20 mA control signal
ZS-100	Weather shield (metal)
ZS-150	Weather shield (polycarbonate)
ZS-260	Explosion-proof housing

NOTE: When using LF24-SR(-S) US actuators, only use accessories listed on this page.
For actuator wiring information and diagrams, refer to Belimo Wiring Guide.

Typical Specification

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 shaft up to a 3/4" diameter and center a 1/2" shaft. The actuator 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.The actuators must be designed so that they may be used for either clockwise or counterclockwise 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 master-slave applications. If required, one SPDT auxiliary switch shall be provided having the capability of being adjustable. Actuators with auxiliary switch 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, have a 5 year warranty, and be manufactured under ISO 9001 International Quality Control Standards. Actuators shall be as manufactured by Belimo.

Wiring Diagrams

INSTALLATION NOTES

1 Provide overload protection and disconnect as required.

2 ***CAUTION** Equipment Damage!*
Actuators may be connected in parallel.
Power consumption and input impedance must be observed.

2 Up to 4 actuators may be connected in parallel. With 4 actuators wired to one 500 Ω resistor. Power consumption must be observed.

3 Actuator may also be powered by 24 VDC.

4 Actuators with plenum rated cable do not have numbers on wires; use color codes instead.

5 Only connect common to neg. (–) leg of control circuits

6 For end position indication, interlock control, fan startup, etc., LF24-SR-S US incorporates one built-in auxiliary switch: 1 x SPDT, 3A (0.5A) @250 VAC, UL Approved, adjustable 0° to 95°.

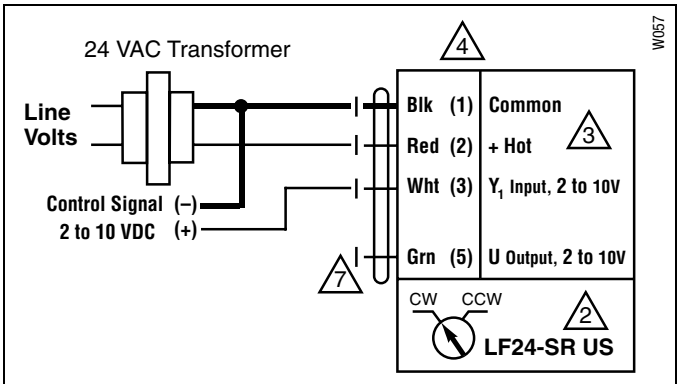
7 The LF24-SR-S US wire 5 is white.

APPLICATION NOTES

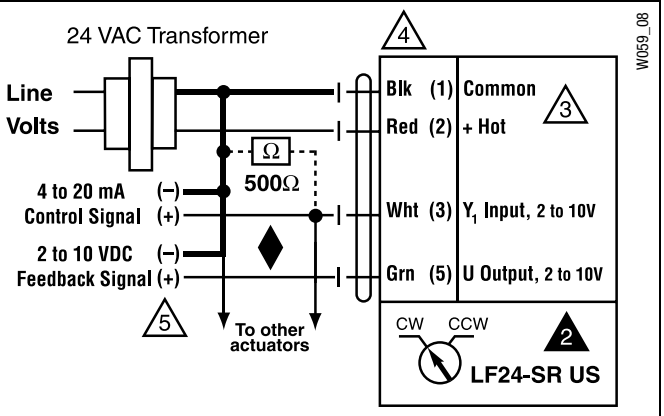
◆ Meets cULus requirements without the need of an electrical ground connection.

◆ The ZG-R01 500 Ω resistor converts the 4 to 20 mA control signal to 2 to 10 VDC.

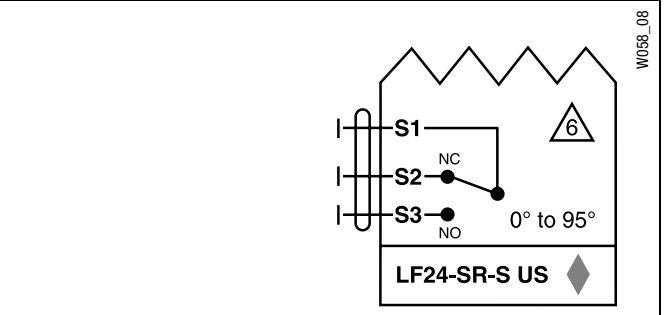
***WARNING** Live Electrical Components!*
During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components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



2 to 10 VDC control of LF24-SR(-S) US



4 to 20 mA control of LF24-SR(-S) US with 2 to 10 VDC feedback output



Auxiliary switch of LF24-SR-S US

LF24-MFT(-S) US

Proportional, Spring Return, Multi-Function Technology®

MFT

5 YEAR WARRANTY

- **Torque min. 35 in-lb**
- **Control 2 to 10 VDC (DEFAULT)**
- **Feedback 2 to 10 VDC (DEFAULT)**

Application

For proportional modulation of dampers and control valves in HVAC systems. The LF24-MFT US provides mechanical spring return operation for reliable fail-safe application.

Default/Configuration

Default parameters for 2 to 10 VDC applications of the LF24-MFT US actuator are assigned during manufacturing. If required, custom versions of the actuator can be ordered. The parameters noted in the Technical Data table are variable.

These parameters can be changed by three means:

- Pre-set configurations from Belimo
- Custom configurations from Belimo
- Configurations set by the customer using the MFT PC tool software application.

Operation

The LF24-MFT US 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 damper or valves mechanical stop and use this point for its zero position during normal control operations.

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 actuator's exact position. 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 with out 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 LF24-MFT US is mounted directly to control shafts up to 3/4" 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 LF24-MFT US actuator is shipped in the zero position, compression against seats or gaskets for tight shut-off is accomplished manually.

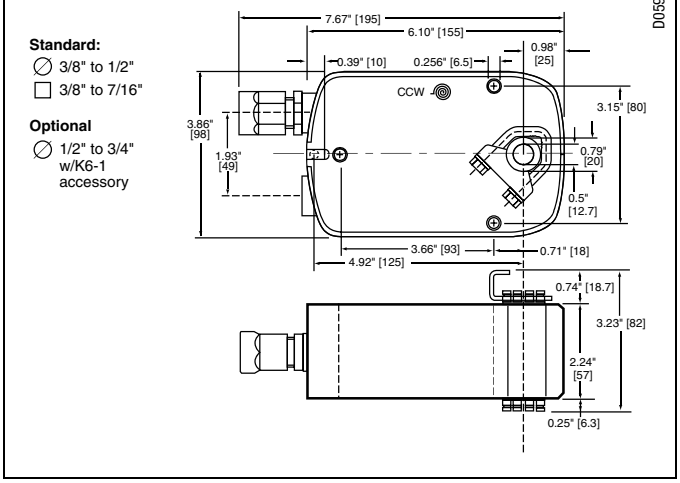
NOTE: Please see documentation on Multi-Function Technology.

Technical Data		LF24-MFT(-S) US
Power supply		24 VAC, ± 20%, 50/60 Hz 24 VDC, ±10%
Power consumption	running	2.5 W
	holding	1.0 W
Transformer sizing		5 VA (Class 2 power source)
Electrical connection (-S models have 2 cables)		3 ft, 18 GA, appliance cables 1/2" conduit connector
Overload protection		electronic throughout 0 to 95° rotation
Operating range Y*		2 to 10 VDC 4 to 20 mA (w/500 Ω, 1/4 Ω resistor) ZG-R01
Input impedance		100 kΩ for 2 to 10 VDC (0.1 mA) 500 Ω for 4 to 20 mA 1500 Ω for PWM, floating point and on/off control
Feedback output U*		2 to 10 VDC, 0.5 mA max
Torque		min 35 in-lb (4 Nm)
Direction of rotation*	spring	reversible with cw/ccw mounting
	motor	reversible with built-in switch
Mech. angle of rotation*		max 95°, adjust with mechanical stop
Running time	motor*	150 sec constant
	spring	<25 sec @-4°F to 122°F [-20°C to 50°C] <60 sec @-22°F [-30°C]
Angle of rotation adaptation*		off (default)
Override control*		Min. (Min Position) = 0% - ZS (Mid. Position) = 50% - Max. (Max. Position) = 100%
Position indication		visual indicator, 0° to 95°
Humidity		5 to 95% RH, non-condensing
Ambient temperature		-22 to 122° F (-30 to 50° C)
Storage temperature		-40 to 176° F (-40 to 80° C)
Housing		NEMA 2, IP54
Housing material		zinc coated metal
Noise level		less than 45 dB (A)
Agency listings		cULus acc. to UL 873 and CAN/CSA C22.2 No. 24-93
Quality standard		ISO 9001
Servicing		maintenance free
Weight		6.0 lbs. (2.7 kg)

* Variable when configured with MFT options

LF24-MFT-S US	
Auxiliary switches	1 x SPDT 3A (0.5A) @ 250 VAC, UL approved adjustable 0° to 95° (double insulated)

Dimensions (Inches [mm])



Wiring Diagrams

INSTALLATION NOTES

1 Provide overload protection and disconnect as required.

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 The Common connection from the actuator must be connected to the Hot connection of the controller.

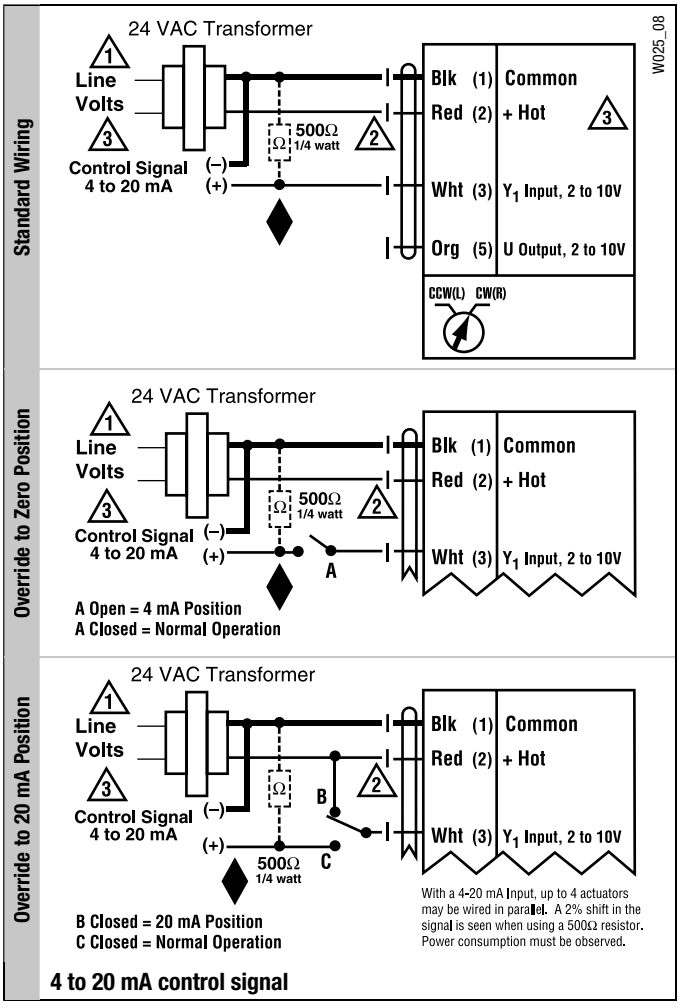
5 For end position indication, interlock control, fan startup, etc., LF24-MFT-S US incorporates one built-in auxiliary switch: 1 x SPDT, 3A (0.5A) @250 VAC, UL Approved, adjustable 0° to 95°.

APPLICATION NOTES

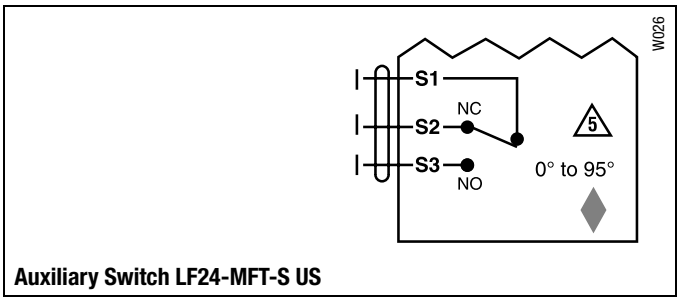
◆ Meets cULus requirements without the need of an electrical ground connection.

◆ The ZG-R01 500 Ω resistor may be used.

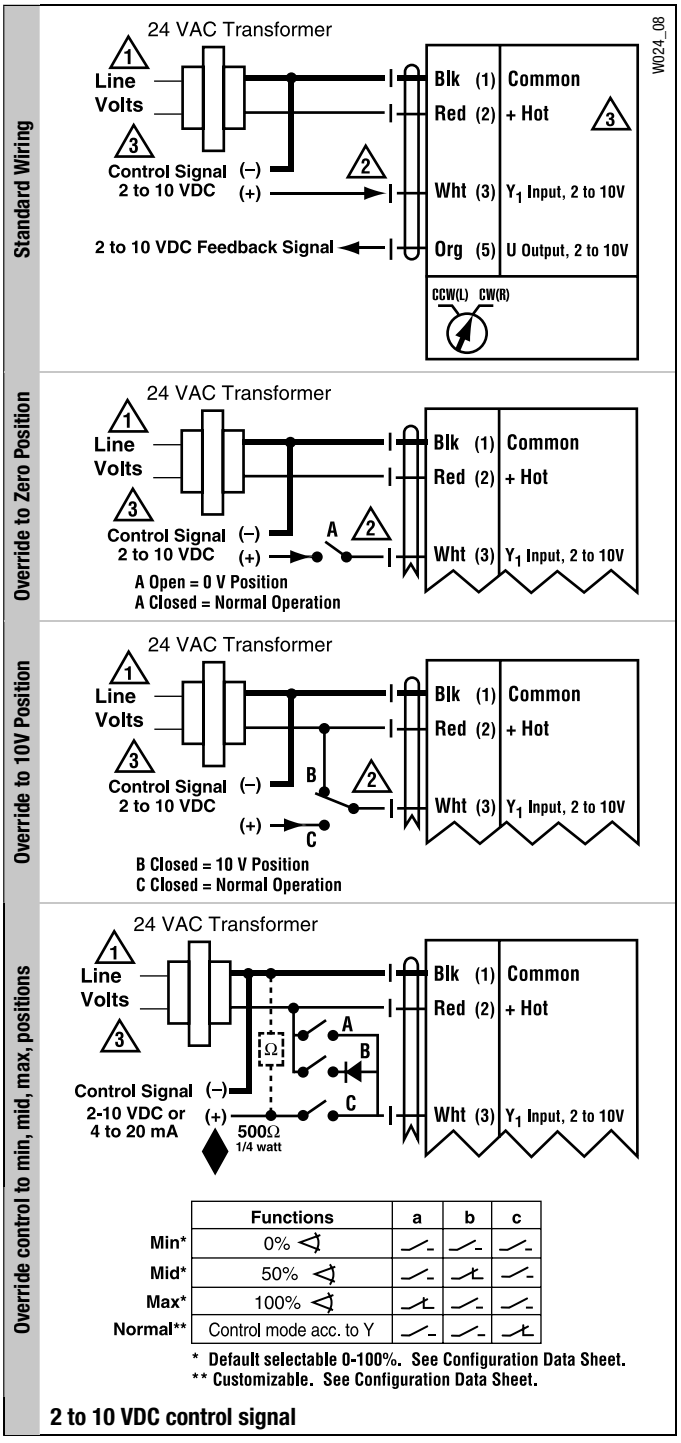
⚠ ***WARNING** Live Electrical Components!*
During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components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



4 to 20 mA control signal



Auxiliary Switch LF24-MFT-S US



	Functions	a	b	c
Min*	0%			
Mid*	50%			
Max*	100%			
Normal**	Control mode acc. to Y			

* Default selectable 0-100%. See Configuration Data Sheet.
** Customizable. See Configuration Data Sheet.

2 to 10 VDC control signal