NFB24-SR, NFB24-SR-S, NFX24-SR, NFX24-SR-S

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

Torque min. 90 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 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 500Ω 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. Not to be used for a master-slave application.

Operation

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

The NFB24-SR and NFX24-SR 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.

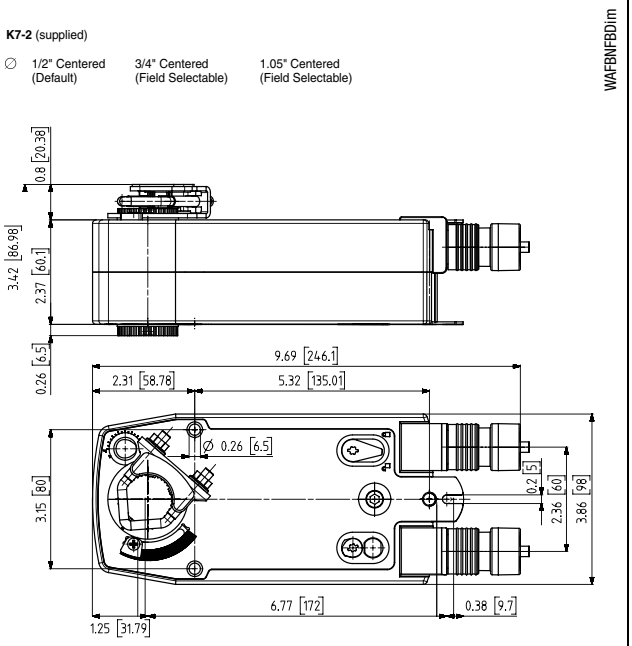
The NFB24-SR-S and NFX24-SR-S versions are provided with two built-in auxiliary switches. These SPDT switches provide safety interfacing or signaling, for example, for fan start-up. The switching function at the fail-safe position is fixed at +10°, the other switch function is adjustable between +10° to +90°. The NFB24-SR, NFB24-SR-S, NFX24-SR and NFX24-SR-S actuator is shipped at +5° (5° from full fail-safe) to provide automatic compression against damper gaskets for tight shut-off.

Technical Data		NFB24-SR, NFB24-SR-S, NFX24-SR, NFX24-SR-S
Power supply		24 VAC ±20%, 50/60 Hz 24 VDC +20% / -10%
Power consumption	running	3.5 W
	holding	2.5 W
Transformer sizing		6 VA (class 2 power source)
Electrical connection		
NFB...		3 ft, 18 GA appliance cable, 1/2" conduit connector **-S models:** two 3 ft, 18 gauge appliance cables with 1/2" conduit connectors
NFX...		3 ft [1m], 10 ft [3m] or 16 ft [5m] 18 GA appliance or plenum cables, with or without 1/2" conduit connector **-S models:** Two 3 ft [1m], 10 ft [3m] or 16 ft [5m] appliance cables, with or without 1/2" conduit connectors
Overload protection		electronic throughout 0 to 95° rotation
Operating range Y		2 to 10 VDC, 4 to 20mA
Input impedance		100 kΩ for 2 to 10 VDC (0.1 mA) 500 Ω for 4 to 20 mA
Feedback output U		2 to 10 VDC (max. 0.5 mA)
Torque		90 in-lb [10 Nm] minimum
Direction of rotation	spring	reversible with CW/CCW mounting
	motor	reversible with built-in switch
Mechanical angle of rotation		95° (adjustable with mechanical end stop, 35° to 95°)
Running time	spring	< 20 seconds @ -4°F to 122°F [-20°C to 50°C]; < 60 seconds @ -22°F [-30°C]
	motor	95 seconds
Position indication		visual indicator, 0° to 95° (0° is full spring return position)
Manual override		5 mm hex crank (3/16" Allen), supplied
Humidity		max. 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, Enclosure Type2
Housing material		zinc coated metal and plastic casing
Agency listings†		cULus acc. to UL60730-1A/-2-14, CAN/CSA E60730-1:02, CE acc. to 2004/108/EC & 2006/95/EC
Noise level		≤40dB(A) motor @ 95 seconds ≤62dB(A) spring return
Servicing		maintenance free
Quality standard		ISO 9001
Weight		4.15 lbs (1.9 kg); 4.4 lbs (2.0 kg) with switches

† Rated Impulse Voltage 800V, Type of action 1.AA (1.AA.B for -S version), Control Pollution Degree 3.

NFB24-SR-S, NFX24-SR-S	
Auxiliary switches	2 x SPDT 3A (0.5A) @ 250 VAC, UL approved one set at +10°, one adjustable 10° to 90°

Dimensions (Inches [mm])



Accessories	
AV 8-25	Shaft extension
IND-AFB	Damper position indicator
KH-AFB	Crank arm
K7-2	Universal clamp for up to 1.05" dia jackshafts
TF-CC US	Conduit fitting
Tool-06	8mm and 10 mm wrench
ZG-100	Universal mounting bracket
ZG-101	Universal mounting bracket
ZG-118	Mounting bracket for Barber Colman® MA 3../4.., Honeywell® Mod III or IV or Johnson® Series 100 replacement or new crank arm type installations
ZG-AFB	Crank arm adaptor kit
ZG-AFB118	Crank arm adaptor kit
ZS-100	Weather shield (metal)
ZS-150	Weather shield (polycarbonate)
ZS-260	Explosion-proof housing
ZS-300	NEMA 4X housing

NOTE: When using NFB24-SR, NFB24-SR-S, NFX24-SR and NFX24-SR-S 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 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 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. Actuators shall be cULus Approved and 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.

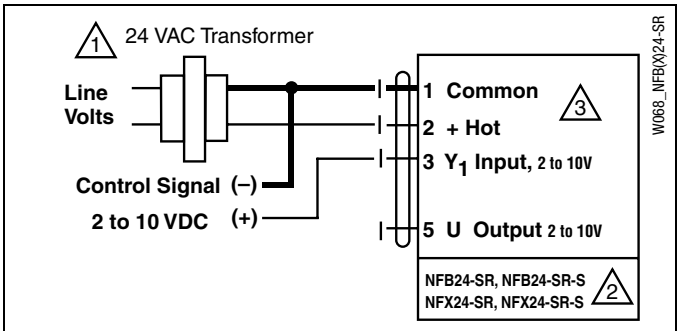
4 For end position indication, interlock control, fan startup, etc., NFB24-SR-S and NFX24-SR-S incorporates two built-in auxiliary switches: 2 x SPDT, 3A (0.5A) @250 VAC, UL Approved, one switch is fixed at +10°, one is adjustable 10° to 90°.

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

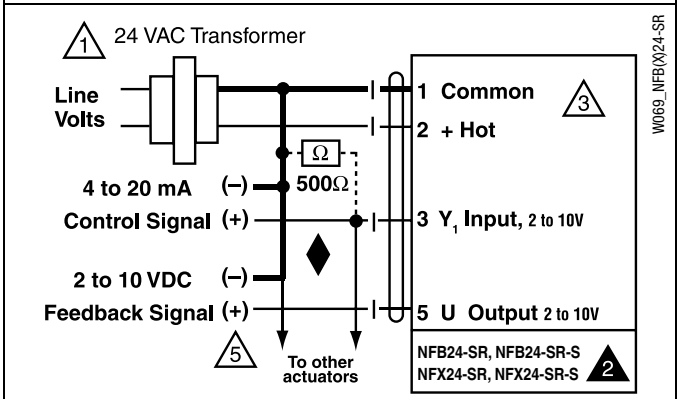
APPLICATION NOTES

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

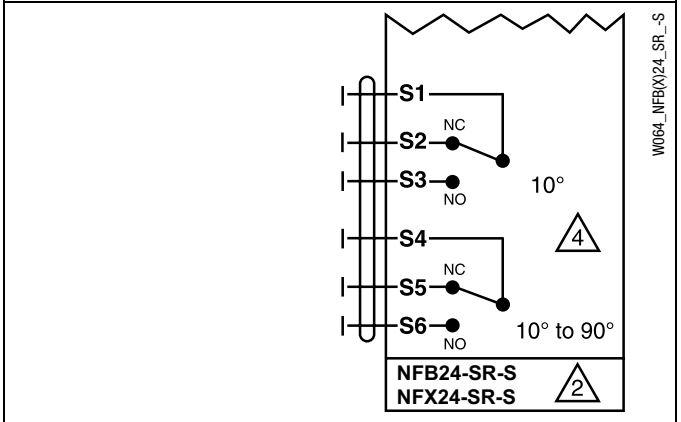
***WARNING** Live Electrical Components!*
During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components 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 NFB24-SR and NFX24-SR



4 to 20 mA control of NFB24-SR and NFX24-SR with 2 to 10 VDC feedback output



Auxiliary switches for NFB24-SR-S, NFX24-SR-S

Custom Options

EFB24-MFT

B = Basic stocked product

- Standard 150 second run time.
- Standard ½" to 1.05" clamp.
- Standard 3' appliance cable with conduit connector.

Typical Lead Time: 1 day

EFX24-MFT

X = Customizable product

- Choice of 10' or 16' cable with conduit connector.
- Factory programming for run time, control signal and feedback (MFT only).

Typical Lead Time: 3 days or less

Reorder number consists of options which differ from standard product. This number is printed on the actuator for easy reordering.
For example:

Reorder # for a EFX24-MFT-S N4 is: EFKL01100A01

4 No Charge
3 No Charge
2 No Charge
1 $1,488
$1,488 Final Price

1 ACTUATOR TYPE

2 MECHANICAL INTERFACE

TYPE	Size	Actuator Series	List Price
No Clamp	-	AFX, NFX, TFX	No Charge
Standard Universal Clamp	1/2" - 1.05"	EFX, AFX, NFX	No Charge
Standard Clamp	1/4" - 1/2"	TFX	No Charge
Crank Arm	-	AFX, NFX	$2

3 CABLES (EXCLUDES EF...N4(H) MODELS)

SINGLE CABLE (with conduit fitting)	Size	Actuator Series	Cable Code	List Price
Plenum 24V (excludes -S models); Default cable for -3, -SR and -MFT TFX models	3 ft.*	EFX, AFX, NFX, TFX	C1	No Charge
	10 ft.	EFX, AFX, NFX, TFX	C3	$28
	16 ft.	EFX, AFX, NFX, TFX	C5	$48
Appliance 24V and 120V; Default cable for On/Off and -S models -S models have two cables 10 ft. cables: $50 16 ft. cables: $90	3 ft.	EFX, AFX, NFX, TFX	A1	No Charge
	10 ft.	EFX, AFX, NFX, TFX	A3	$28
	16 ft.	EFX, AFX, NFX, TFX	A5	$48

* Only option for AFX24-MFT95

4 PROGRAM (SELECTABLE ON MFT MODELS ONLY)

	Running Time	Control Input	Feedback	Actuator Series	Program Code	List Price
On/Off	75 seconds	On/Off	-	EFX	003	No Charge
	<75 seconds	On/Off	-	AFX, NFX, TFX	003	No Charge
	<30 seconds	On/Off	-	TFCX only	013	No Charge
-3	95 seconds	Floating Point	-	TFX	H34	No Charge
-SR	95 seconds	2-10 VDC	2-10 VDC	EFX, AFX, NFX, TFX	H01	No Charge
-MFT	150 seconds	2-10 VDC	2-10 VDC	EFX, AFX, NFX, TFX	A01	No Charge
	150 seconds	0.5-10 VDC	0.5-10 VDC	EFX, AFX, NFX, TFX	AC2	No Charge
	90 seconds	2-10 VDC	2-10 VDC	EFX, AFX, NFX, TFX	AC1	No Charge
	90 seconds	0.5-10 VDC	0.5-10 VDC	EFX, AFX, NFX, TFX	ACA	No Charge
	60 seconds	2-10 VDC	2-10 VDC	EFX, NFX	AEH	No Charge
	70 seconds	2-10 VDC	2-10 VDC	EFX, AFX, NFX	ADW	No Charge
	40 seconds	2-10 VDC	2-10 VDC	NFX	ADX	No Charge
	150 seconds	Floating Point	2-10 VDC	EFX, AFX, NFX, TFX	F01	No Charge
	90 seconds	Floating Point	2-10 VDC	EFX, AFX, NFX, TFX	F14	$34
	75 seconds	Floating Point	0.5-10 VDC	EFX, AFX, NFX, TFX	F11	$34
	45 seconds	Floating Point	2-10 VDC	NFX	F19	No Charge
	60 seconds	On/Off	2-10 VDC	EFX, NFX	J19	No Charge
	75 seconds	On/Off	2-10 VDC	EFX, AFX, NFX, TFX	J01	$34
	150 seconds	On/Off	2-10 VDC	EFX, AFX, NFX, TFX	J02	No Charge

Multi-Function Technology offers a wide variety of programmable control inputs and feedback signals. Parameters can be set for voltage control (VDC), time proportional control (PWM), floating point, on/off and feedback signal. Parameters can be changed on-site to optimize/enable application. You can also set, modify or read position, running time, mechanical working range, address, status, and diagnostics.

For MFT programming codes, refer to MFT technical documentation or visit www.belimo.us.