

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

- Torque motor 90 in-lb [10 Nm]
- Nominal voltage AC/DC 24 V
- Control MFT/programmable
- Position feedback 2...10 V
- 2 x SPDT
- NEMA 4X



5-year warranty



**MFT**

Technical data

<b>Electrical data</b>	Nominal voltage	AC/DC 24 V
	Nominal voltage frequency	50/60 Hz
	Nominal voltage range	AC 19.2...28.8 V / DC 21.6...28.8 V
	Power consumption in operation	6.5 W
	Power consumption in rest position	3 W
	Transformer sizing	9 VA
	Auxiliary switch	2 x SPDT, 1 mA...3 A (0.5 A inductive), DC 5 V...AC 250 V, one set at 10°, one adjustable 10...90°
	Switching capacity auxiliary switch	1 mA...3 A (0.5 A inductive), DC 5 V...AC 250 V
	Electrical Connection	(2) 18 GA appliance cables, 1 m, 3 m or 5 m, with 1/2" conduit connectors
	Overload Protection	electronic throughout 0...95° rotation
	Electrical Protection	actuators are double insulated
<b>Functional data</b>	Torque motor	90 in-lb [10 Nm]
	Operating range Y	2...10 V
	Operating range Y note	4...20 mA w/ ZG-R01 (500 Ω, 1/4 W resistor)
	Input impedance	100 kΩ for 2...10 V (0.1 mA), 500 Ω for 4...20 mA, 1500 Ω for PWM, On/Off and Floating point
	Operating range Y variable	Start point 0.5...30 V End point 2.5...32 V
	Operating modes optional	variable (VDC, PWM, on/off, floating point)
	Position feedback U	2...10 V
	Position feedback U note	Max. 0.5 mA
	Position feedback U variable	VDC variable
	Direction of motion motor	selectable with switch 0/1
	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	40...150 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)	

<b>Functional data</b>	Position indication	Mechanical, 5...20 mm stroke
<b>Safety data</b>	Power source UL	Class 2 Supply
	Degree of protection IEC/EN	IP66
	Degree of protection NEMA/UL	NEMA 4X
	Enclosure	UL Enclosure Type 4X
	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
	Ambient humidity	Max. 100% RH
	Ambient temperature	-22...122°F [-30...50°C]
	Ambient temperature note	-40...50°C for actuator with integrated heating
	Storage temperature	-40...176°F [-40...80°C]
	Servicing	maintenance-free
<b>Weight</b>	Weight	6.0 lb [2.7 kg]
<b>Materials</b>	Housing material	Polycarbonate

**Footnotes** \*Variable when configured with MFT options.

†Rated Impulse Voltage 800V, Type of action 1.AA.B, Control Pollution Degree 4.

## Product features

<b>Default/Configuration</b>	Default parameters for 2 to 10 VDC applications of the NF..-MFT actuator are assigned during manufacturing. If required, custom versions of the actuator can be ordered. The parameters are variable and can be changed by three means: Factory pre-set or custom configuration, set by the customer using PC-Tool software or the handheld ZTH US.
<b>Application</b>	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.
<b>Operation</b>	The NF..24-MFT N4 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'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 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 NF..24-MFT N4 is mounted directly to control shafts up to 1.05" diameter by means of its universal clamp and anti-rotation bracket. The spring return system provides minimum specified torque to the application during a power interruption. The NF..24-MFT N4 actuator is shipped at 5° (5° from full fail-safe) to provide automatic compression against damper gaskets for tight shut-off. For low ambient temperatures, the optional supplemental (-Y) Heater add-on is available.

**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 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. Actuators shall be cULus listed and have a 5 year warranty, and be manufactured under ISO 9001 International Quality Control Standards. Actuators shall be as manufactured by Belimo.

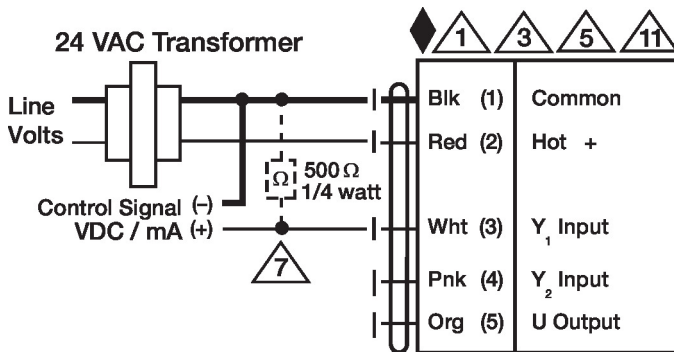
**Factory settings** Default parameters for 2 to 10 VDC applications of the NF..-MFT actuator are assigned during manufacturing. If required, custom versions of the actuator can be ordered. The parameters are variable and can be changed by three means: Factory pre-set or custom configuration, set by the customer using PC-Tool software or the handheld ZTH US.

**Accessories**

	<b>Description</b>	<b>Type</b>	
<b>Electrical accessories</b>	Gasket for cable gland (NEMA 4 models)	11097-00001	
	Cable Gland (NEMA 4 models)	43442-00001	
	DC Voltage Input Rescaling Module	IRM-100	
	Auxiliary switch, mercury-free	P475	
	Auxiliary switch, mercury-free	P475-1	
	Convert Pulse Width Modulated Signal to a 2...10 V Signal for Belimo Proportional Actuators	PTA-250	
	Positioner for wall mounting	SGA24	
	Positioner for front-panel mounting	SGF24	
	Gateway MP to BACnet MS/TP	UK24BAC	
	Resistor, 500 Ω, 1/4" wire resistor with 6" pigtail wires	ZG-R01	
	Resistor kit, 50% voltage divider	ZG-R02	
	Transformer, AC 120 V to AC 24 V, 40 VA	ZG-X40	
	<b>Mechanical accessories</b>	<b>Description</b>	<b>Type</b>
		Anti-rotation bracket, for AF / NF	AF-P
Ball joint suitable for damper crank arm KH8 / KH10, Multipack 10 pcs.		KG10A	
Damper crank arm Slot width 8.2 mm, clamping range ø14...25 mm		KH10	
Push rod for KG10A ball joint 36" L, 3/8" diameter		SH10	
Wrench 0.32 in and 0.39 in [8 mm and 10 mm]		TOOL-06	
Wrench 0.512 in. [13 mm]		TOOL-07	
Damper clip for damper blade, 3.5" width.		ZG-DC1	
Damper clip for damper blade, 6" width.		ZG-DC2	
1" diameter jackshaft adaptor (11" L).		ZG-JSA-1	
1-5/16" diameter jackshaft adaptor (12" L).		ZG-JSA-2	
1.05" diameter jackshaft adaptor (12" L).		ZG-JSA-3	
<b>Tools</b>	<b>Description</b>	<b>Type</b>	
	Belimo PC-Tool, Software for adjustments and diagnostics	MFT-P	
	Signal simulator, Power supply AC 120 V	PS-100	
	Gateway MP to LonWorks	UK24LON	
	Gateway MP to Modbus RTU	UK24MOD	
	Connecting cable 16 ft [5 m], A: RJ11 6/4 ZTH EU, B: free wire end for connection to MP/PP terminal	ZK2-GEN	
	Service Tool, with ZIP-USB function, for programmable and communicative Belimo actuators, VAV controller and HVAC performance devices	ZTH US	
<b>Factory add-on option only</b>	<b>Description</b>	<b>Type</b>	
	Heater, with adjustable thermostat	N4 Heater Add-on 24V (-H)	

Electrical installation

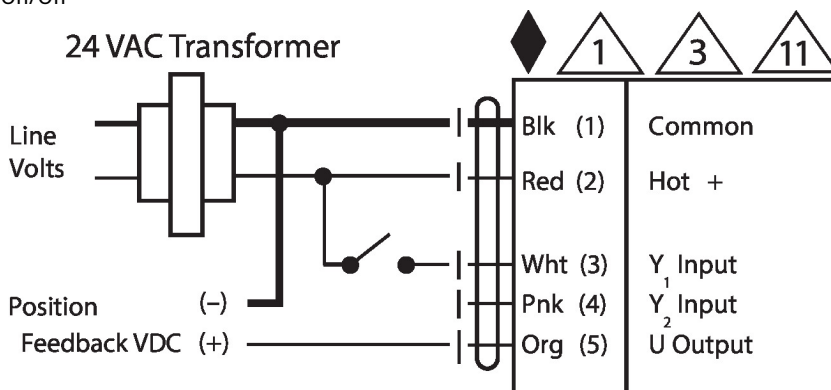
- ⚠ Warning! Live electrical components!**  
During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.
- ◆ Meets cULus requirements without the need of an electrical ground connection.
- ⚠** Apply only AC line voltage or only UL-Class 2 voltage to the terminals of auxiliary switches. Mixed or combined operation of line voltage/safety extra low voltage is not allowed.
- (A)** Actuators with appliance cables are numbered.
- ⚠** Provide overload protection and disconnect as required.
- ⚠** Actuators may also be powered by DC 24 V.
- ⚠** Two built-in auxiliary switches (2x SPDT), for end position indication, interlock control, fan startup, etc.
- ⚠** Only connect common to negative (-) leg of control circuits.
- ⚠** A 500 Ω resistor (ZG-R01) converts the 4...20 mA control signal to 2...10 V.
- ⚠** Control signal may be pulsed from either the Hot (Source) or Common (Sink) 24 V line.
- ⚠** For triac sink the Common connection from the actuator must be connected to the Hot connection of the controller. Position feedback cannot be used with a triac sink controller; the actuator internal common reference is not compatible.
- ⚠** Actuators may be connected in parallel if not mechanically linked. Power consumption and input impedance must be observed.
- ⚠** IN4004 or IN4007 diode. (IN4007 supplied, Belimo part number 40155).



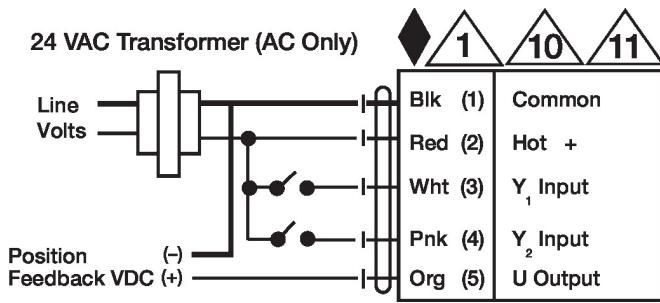
VDC/ma Control

**Wiring diagrams**

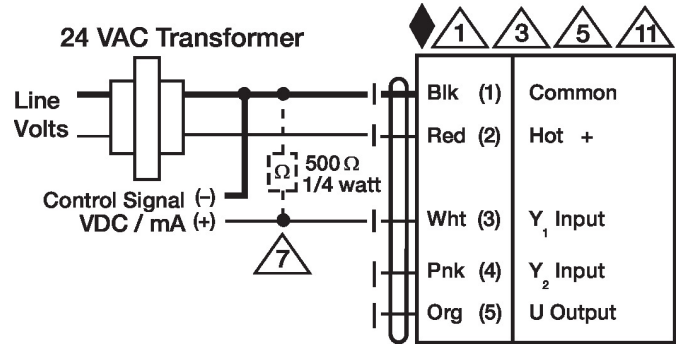
On/Off



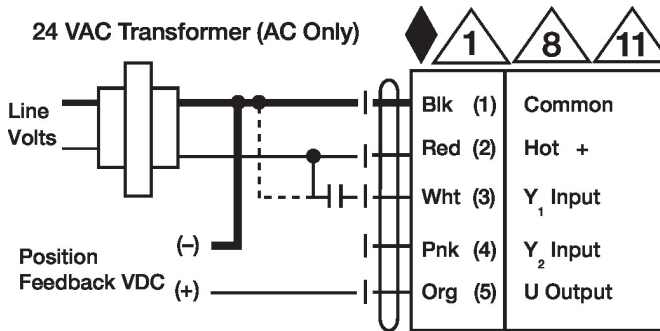
Floating Point



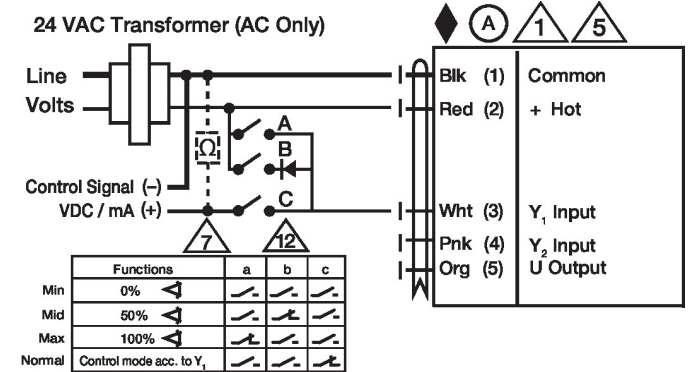
VDC/mA Control



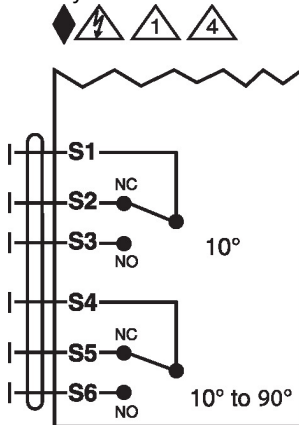
PWM Control



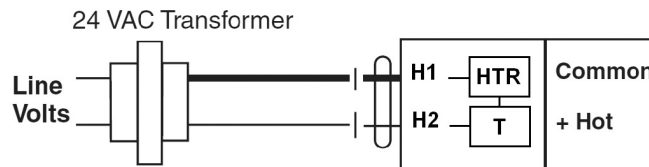
Override Control



Auxiliary Switches



NEMA 4 Heater Option



## Dimensions

