AFX24-MFT N4 Damper Actuator Technical Data Sheet

NEMA 4, Modulating, Spring Return, 24 V, Multi-Function Technology®

Torque min. 180 in-lb, Control DC 2...10 V (DEFAULT), Feedback DC 2...10 V (DEFAULT).

Application

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 master-slave 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. Master-Slave wiring for either configuration. Actuators must be mechanically linked.

When not mechanically linked, actuators must be wired in parallel.

Default/Configuration

Default parameters for 2 to 10 VDC applications of the AF..-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.

Operation

The AF..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 AF..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 AF..24-MFT N4 actuator is shipped at 5° (5° from full fail-safe) to provide automatic compression against damper gaskets for tight shut-off.

Installation Note: Use suitable flexible metallic conduit or its equivalent with the conduit fitting. Not suitable for plenum applications.

For low ambient temperatures, the optional supplemental (-Y) Heater add-on is available.

Technical Data	
Power Supply	24 VAC, ±20%, 50/60 Hz, 24 VDC, -10% / +20%
Power consumption in operation	7.5 W
Power consumption in rest position	3 W
Transformer sizing	10 VA (class 2 power source)
Shaft Diameter	1/2...1.05" round, centers on 3/4" with insert, 1.05" without insert
Electrical Connection	18 GA appliance cables, 3 ft [1 m], 10 ft [3 m] or 16ft [5 m], with 1/2" conduit connector
Overload Protection	electronic throughout 0...95° rotation
Electrical Protection	actuators are double insulated
Operating Range	2...10 V (default), 4...20 mA w/ ZG-R01 (500 Ω, 1/4 W resistor), variable (VDC, PWM, on/off, floating point)
Operating range Y variable	Start point 0.5...30 V End point 2.5...32 V
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
Position Feedback	2...10 V, Max. 0.5 mA, VDC variable
Angle of rotation	95°, adjustable with mechanical end stop, 35...95°
Torque motor	180 in-lb [20 Nm]
Direction of motion motor	selectable with switch 0/1
Direction of motion fail-safe	reversible with cw/ccw mounting
Position indication	Mechanically, 5...20 mm stroke
Manual override	5 mm hex crank (3/16" Allen), supplied
Running Time (Motor)	default 150 s, variable 70...220 s
Running time fail-safe	<20 s @ -4...122°F [-20...50°C], <60 s @ -22°F [-30°C]
Angle of rotation adaptation	off (default)
override control	min. position = 0% , mid. Position = 50% , max. position = 100% (Default)
Ambient humidity	max. 95% r.H., non-condensing
Ambient temperature	-22...122°F [-30...50°C]
Storage temperature	-40...176°F [-40...80°C]
Degree of Protection	IP66, NEMA 4X, UL Enclosure Type 4X
Housing material	Polycarbonate
Agency Listing	cULus acc. to UL60730-1A/-2-14, CAN/CSA E60730-1:02, CE acc. to 2014/30/EU
Noise level, motor	40 dB(A)
Noise level, fail-safe	62 dB(A)
Servicing	maintenance-free
Quality Standard	ISO 9001
Weight	8.5 lb [3.9 kg]

*Variable when configured with MFT options.
†Rated Impulse Voltage 800V, Type of action 1.AA, Control Pollution Degree 4.

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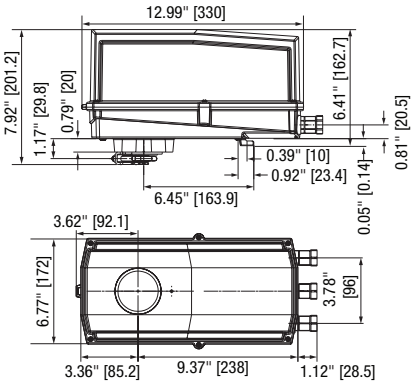
Dimensions (Inches[mm])



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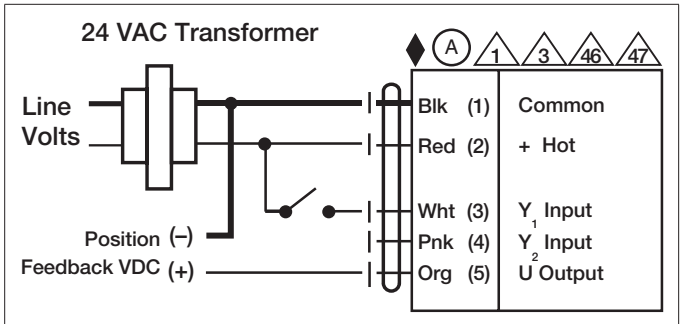
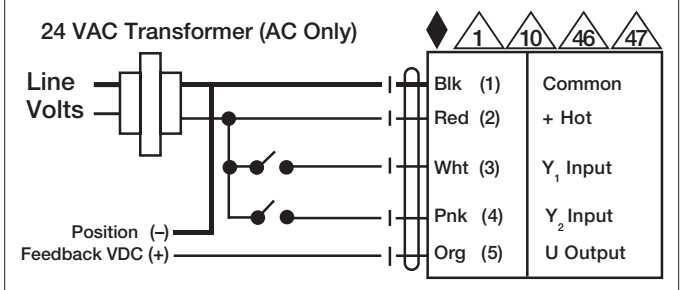
Accessories	
AF-P	Anti-rotation bracket AF/NF.
KG10A	Ball joint
KH10	Damper crank arm
SH10	Push rod for KG10A ball joint (36” L, 3/8” diameter).
TOOL-06	8 mm and 10 mm wrench.
TOOL-07	13 mm wrench.
ZG-DC1	Damper clip for damper blade, 3.5” width.
ZG-DC2	Damper clip for damper blade, 6” width.
ZG-JSA-1	1” diameter jackshaft adaptor (11” L).
ZG-JSA-2	1-5/16” diameter jackshaft adaptor (12” L).
ZG-JSA-3	1.05” diameter jackshaft adaptor (12” L).
11097-00001	Gasket for cable gland (for NEMA 4 models).
43442-00001	Cable gland (for NEMA 4 models).
IRM-100	Input rescaling module for modulating actuators.
MFT-P	Belimo PC-Tool
P475	Shaft mount, non-Mercury aux. switch for 1/2” dia. shafts.
P475-1	Shaft mount, non-Mercury aux. switch for 1” dia. shafts.
PS-100	Low voltage and control signal simulator.
PTA-250	Pulse width modulation interface for modulating actuators.
SGA24	Positioners suitable for use with the modulating damper actuators LM..A-SR, NM..A-SR, SM..A-SR and GM..A-SR
SGF24	Positioners suitable for use with the modulating damper actuators LM..A-SR, NM..A-SR, SM..A-SR and GM..A-SR
UK24BAC	Gateway MP to BACnet MS/TP
UK24LON	Gateway MP to LonWorks
UK24MOD	Gateway MP to Modbus RTU
ZG-R01	4 to 20 mA adaptor, 500Ω, 1/4 W resistor w 6” pigtail wires.
ZG-R02	50% voltage divider kit (resistors with wires).
ZG-SGF	Mounting plate for SGF.
ZG-X40	120 to 24 VAC, 40 VA transformer.
ZK2-GEN	Connection cable
ZTH US	Handheld programming tool w/ ZK1-GEN, ZK2-GEN, ZK6-GEN.

Typical Specification

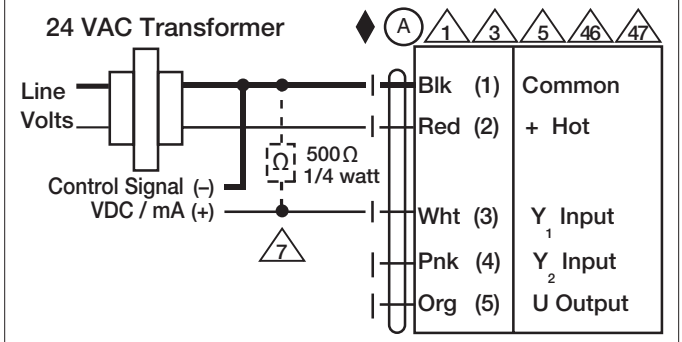
Spring return control damper actuators shall be direct coupled type which require no crank arm and linkage and be capable of direct mounting to a jackshaft up to a 1.05” diameter. The actuator must provide modulating damper control in response to a 2 to 10 VDC or, with the addition of a 500Ω resistor, 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 or master slave 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 have a 5 year warranty, and be manufactured under ISO 9001 International Quality Control Standards. Actuators shall be as manufactured by Belimo.



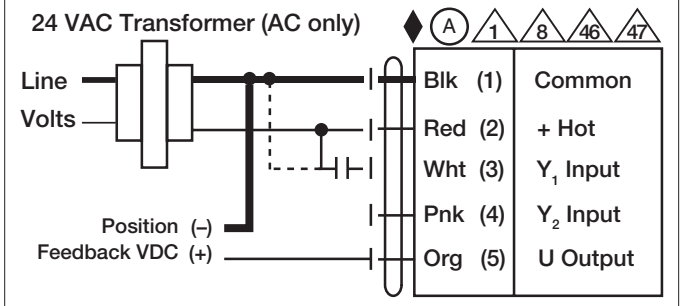
On/Off



Floating Point



VDC/mA Control



PWM Control

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Wiring Diagrams

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.

A — Actuators with appliance cables are numbered.

1 — Provide overload protection and disconnect as required.

3 — Actuators may also be powered by 24 VDC.

5 — Only connect common to negative (-) leg of control circuits.

7 — A 500 Ω resistor (ZG-R01) converts the 4 to 20 mA control signal to 2 to 10 VDC.

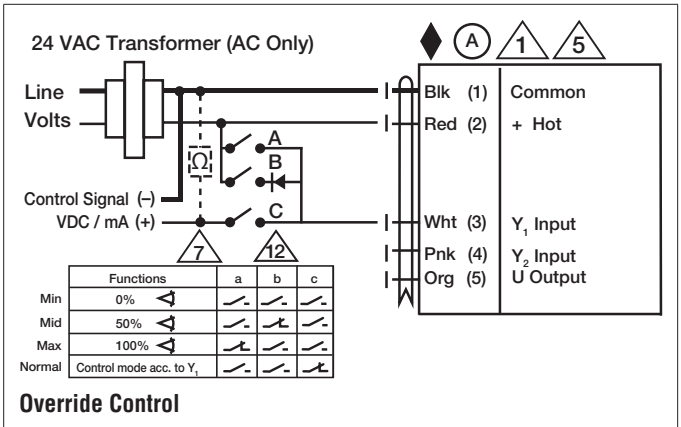
8 — Control signal may be pulsed from either the Hot (Source) or Common (Sink) 24 VAC line.

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.

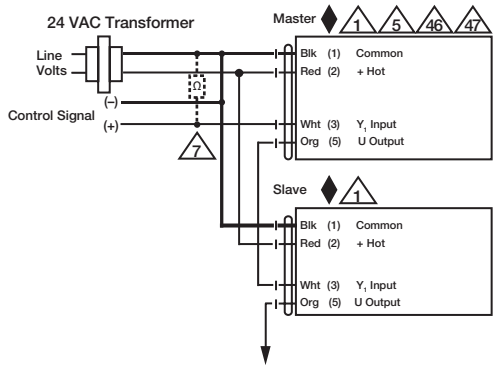
12 — IN4004 or IN4007 diode. (IN4007 supplied, Belimo part number 40155).

67 — Actuators may be controlled in parallel when not mechanically linked. Current draw and input impedance must be observed.

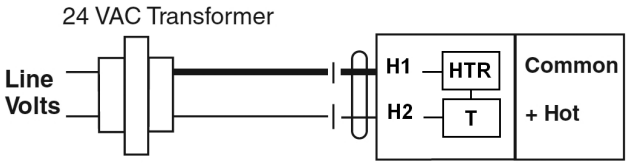
68 — Master-Slave wiring required for piggy-back applications when mechanically linked. Feedback from Master to control input(s) of Slave(s).



Override Control



Master - Slave



NEMA 4 Heater