

AFX24-MFT N4 Damper Actuator Technical Data Sheet

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



| 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 (minimum position) = 0% MID (intermediate position) = 50% MAX (maximum position) = 100% |
| 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 and 2014/35/EU; Listed to UL 2043 - suitable for use in air plenums per Section 300.22(c) of the NEC and Section 602.2 of the IMC |
| Noise level, motor | 40 dB(A) |
| Noise level, fail-safe | 62 dB(A) |
| Servicing | maintenance-free |

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.-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.

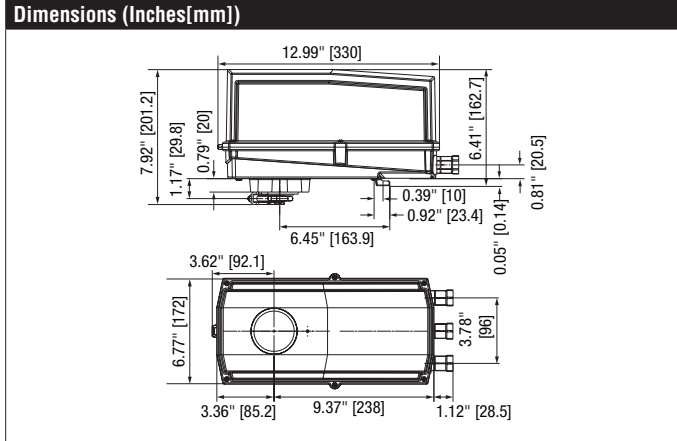
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| | |
|------------------------|------------------|
| Noise level, fail-safe | 62 dB(A) |
| Servicing | maintenance-free |
| Quality Standard | ISO 9001 |
| Weight | 8.5 lb [3.9 kg] |

*Variable when configured with MFT options.

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



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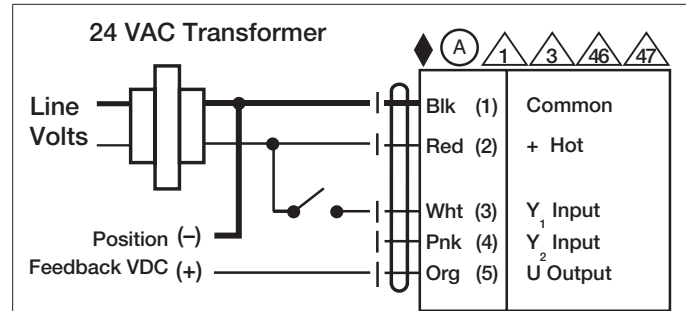


Accessories

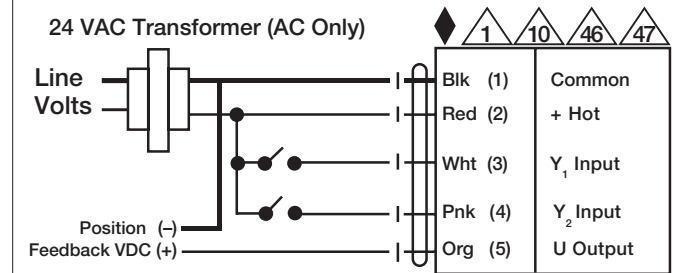
| | |
|-------------|---|
| AF-P | Anti-rotation bracket AF/NF. |
| KG10A | Ball joint |
| KH10 | Damper crank arm |
| SH10 | Push rod for KG10A ball joint (36" L, 3/8" diameter). |
| TOOL-06 | 8 mm and 10 mm wrench. |
| TOOL-07 | 13 mm wrench. |
| ZG-DC1 | Damper clip for damper blade, 3.5" width. |
| 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

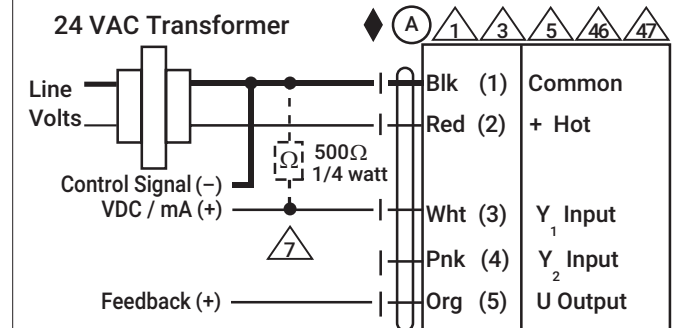
Spring return control damper actuators shall be direct coupled type which require no crank arm and linkage and be capable of direct mounting to a jackshaft up to a 1.05" diameter. The actuator must provide modulating damper control in response to a 2 to 10 VDC or, with the addition of a 500Ω resistor, 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.



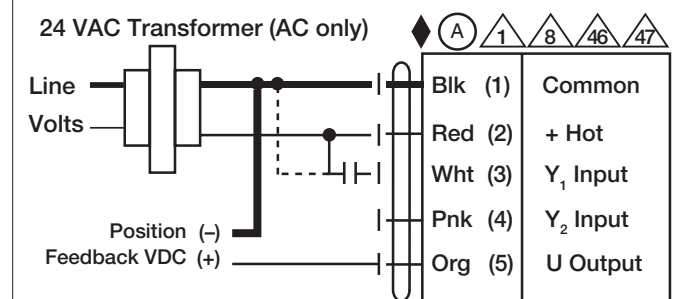
On/Off



Floating Point



VDC/mA Control



PWM Control

Date created, 04/15/2020 - Subject to change. © Belimo Aircontrols (USA), Inc.

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.

Ⓐ 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 10 VDC.

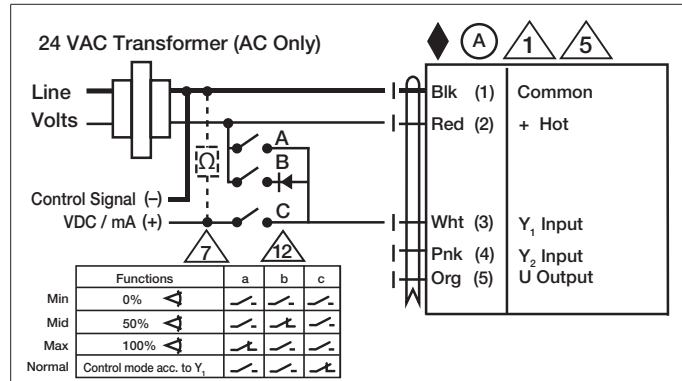
8 Control signal may be pulsed from either the Hot (Source) or Common (Sink) 24 VAC line.

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.

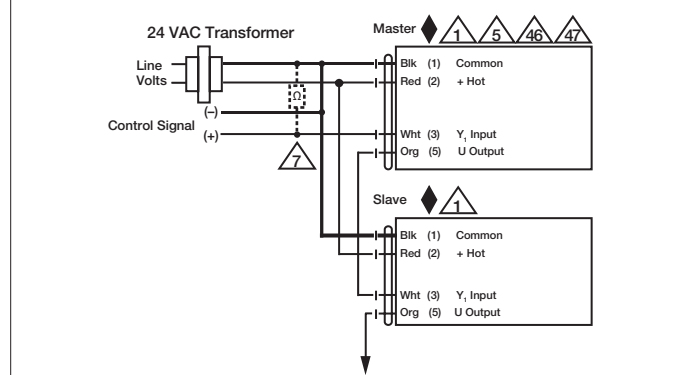
12 IN4004 or IN4007 diode. (IN4007 supplied, Belimo part number 40155).

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

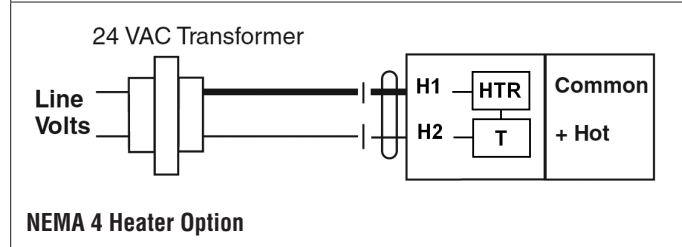
68 Master-Slave wiring required for piggy-back applications when mechanically linked. Feedback from Master to control input(s) of Slave(s).



Override Control



Master - Slave



NEMA 4 Heater Option