BELIMO

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

• Torque motor 180 in-lb [20 Nm]
• Nominal voltage AC/DC 24 V
• Control MFT/programmable
• Position feedback 2...10 V
• NEMA 4X

5

5-year warranty

CE · LISTED 94 D5 TEMP. IND. & REG. EQUIP. · c UL us

MFT

Technical data

Electrical data	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	7.5 W
	Power consumption in rest position	3 W
	Transformer sizing	10 VA
	Electrical Connection	18 GA plenum cable, 1 m, with 1/2" conduit connector
	Overload Protection	electronic throughout 0...95° rotation
	Electrical Protection	actuators are double insulated
Functional data	Torque motor	180 in-lb [20 Nm]
	Operating range Y	0...135 Ω
	Operating range Y note	Honeywell Electronic Series 90, input 0...135 Ω
	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	70...220 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)
	Position indication	Mechanical, 5...20 mm stroke
Safety data	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

Safety data	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

Weight	Weight	8.5 lb [3.9 kg]

Materials	Housing material	Polycarbonate

Footnotes

*Variable when configured with MFT options.

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

Product features

Default/Configuration

Default parameters for 0 to 135Ω input applications of the AF..-MFT95 actuator are assigned during manufacturing. If required, custom versions of the actuator can be ordered, however the control input cannot be modified via MFT PC tool software. The other 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.

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 of up to 360 in-lbs. Minimum 3/4" diameter shaft. OR Maximum of three AF's can be piggybacked for torque loads of up to 432 in-lbs. Minimum 3/4" diameter shaft. Master-Slave wiring for either configuration.

Operation

The AF..24-MFT95 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 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 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-MFT95 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-MFT95 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.

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 0 to 135 ohm control input from a Honeywell Series 90 controller or equivalent. 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 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 0 to 135Ω input applications of the AF..-MFT95 actuator are assigned during manufacturing. If required, custom versions of the actuator can be ordered, however the control input cannot be modified via MFT PC tool software. The other 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

Electrical accessories

Description	Type
Gasket for cable gland (NEMA 4 models)	11097-00001
Cable Gland (NEMA 4 models)	43442-00001
Auxiliary switch, mercury-free	P475
Auxiliary switch, mercury-free	P475-1
Signal simulator, Power supply AC 120 V	PS-100
Resistor kit, for -MFT95 actuator in 0...135 Ω control application	ZG-R03
Transformer, AC 120 V to AC 24 V, 40 VA	ZG-X40

Mechanical accessories

Description	Type
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

Tools

Description	Type
Belimo PC-Tool, Software for adjustments and diagnostics	MFT-P
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

Factory add-on option only

Description	Type
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.

⚠1 Provide overload protection and disconnect as required.

⚠3 Actuators may also be powered by DC 24 V.

⚠22 Actuators and controller must have separate transformers.

⚠23 Consult controller instruction data for more detailed information.

⚠24 Resistor value depends on the type of controller and the number of actuators. No resistor is used for one actuator. Honeywell® resistor kits may also be used.
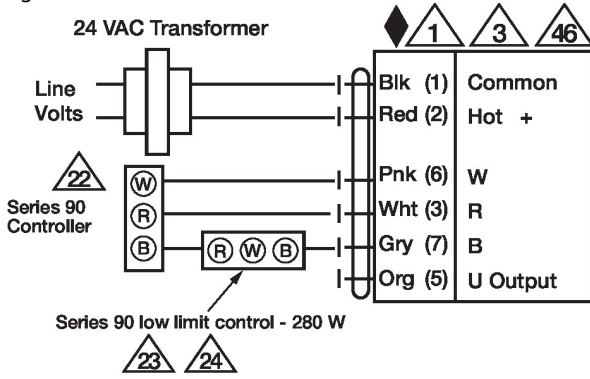
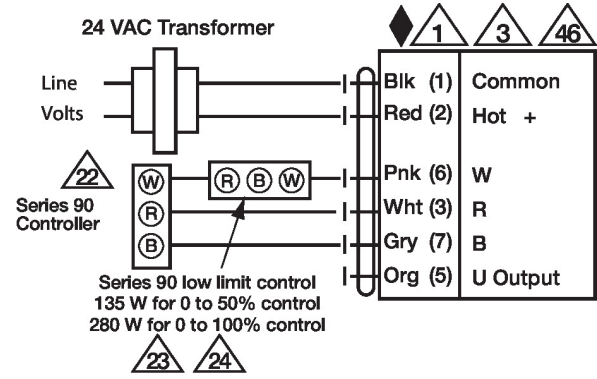⚠25 To reverse control rotation, use the reversing switch.

⚠46 Actuators may be controlled in parallel. Current draw and input impedance must be observed.
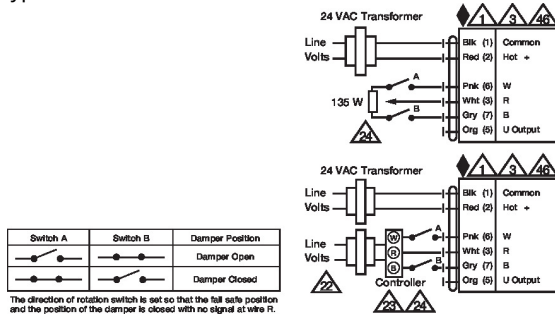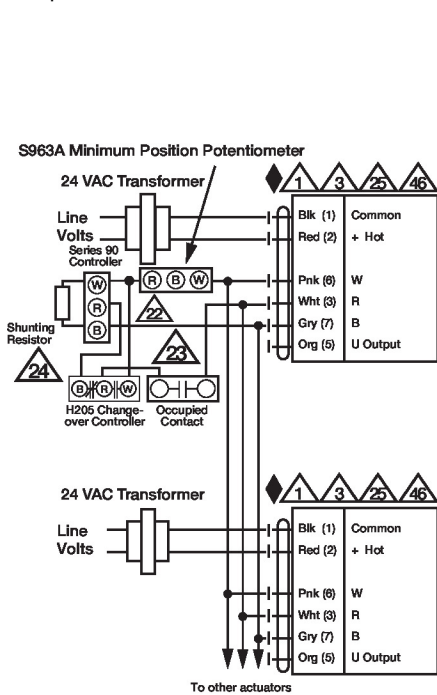
Wiring diagrams
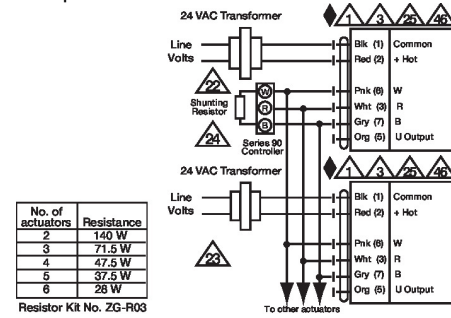
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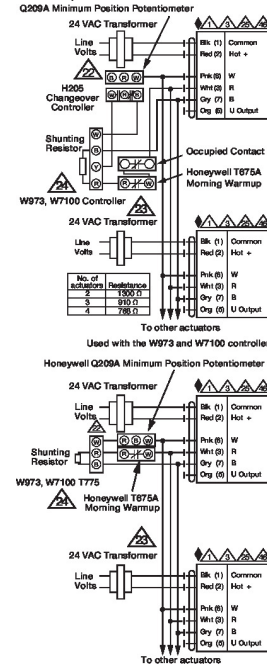

Low Limit Control

Typical and Override Control

Multiple Actuators

No. of actuators	Resistance
2	140 W
3	71.5 W
4	47.5 W
5	37.5 W
6	28 W

Resistor Kit No. ZG-R03

Multiple Actuators with Minimum Position Potentiometer

Multiple Actuators Used with W973, W7100 and T775

No. of actuators	Resistance
2	1300 Ω
3	910 Ω
4	766 Ω

NEMA 4 Heater Option

Dimensions