

# AF24-ECON-R03 US

Proportional, Spring Return, 24V, for Stand-Alone Economizer Damper Control Using 3 kΩ Mixed Air Sensor, Built-in Minimum Position Adjustment



Technical Data		AF24... US
Power supply		24 VAC ± 20% 50/60 Hz, 24 VDC ± 10%
Power consumption	running	6 W
	holding	2.5 W
Transformer sizing		10 VA (class 2 power source)
Electrical connection		3 ft, plenum rated cable 1/2" conduit connector
Overload protection		electronic throughout 0 to 95° rotation
Control Signal	Y1	3 kΩ NTC Type 10 thermistor, 3 kΩ @ 77°F (25°C) MA setpoint = 55°F
Input impedance	Y1	100 kΩ
	Y2	100 kΩ
Feedback output, U		2 to 10 VDC (max. 0.7 mA) for 95°
Angle of rotation		max. 95°, adjustable with mechanical stop
Torque		133 in-lb [15 Nm]
Override function		See override control table on opposite page
Direction of rotation	spring	reversible with cw/ccw mounting
Position indication		visual indicator, 0° to 95° scaled as 0 to 1 (0° is spring return position)
Running time	motor	95 seconds constant, independent of load
	spring	< 20 seconds @ -4°F to 122°F [-20°C to 50°C] < 60 seconds @ -22°F [-30°C]
Humidity		5 to 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 type 2 / IP54
Housing material		zinc coated steel
Agency listings		cULus acc. to UL 873 and CAN/CSA C22.2 No. 24-93
Noise level (max)	running	<45 dB (A)
	spring return	62 dB (A)
Servicing		maintenance free
Quality standard		ISO 9001
Weight		6.0 lbs (2.7 kg)

- Torque min. 133 in-lb, for control of air dampers
- Built-in adjustable min-position
- Integrated mixed air PI-control

## Application

For proportional control of mixed air setpoint on economizer 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 3 kΩ thermistor.

## Operation

The AF 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 consistent torque to the damper with, and without, power applied to the actuator.

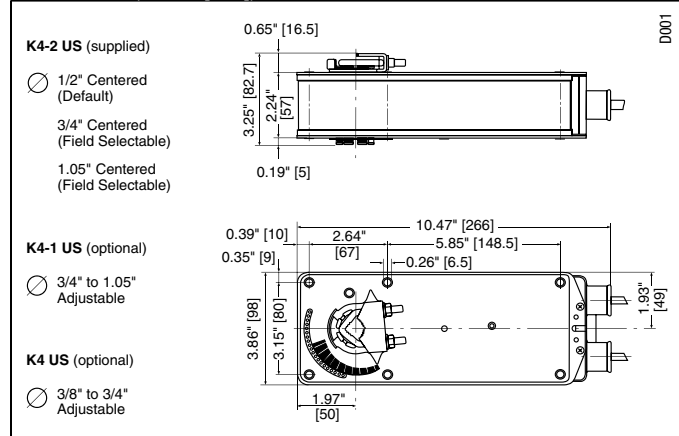
The AF24-ECON-R03 US provide 95° of rotation and are provided with a graduated position indicator showing 0° to 95°. The actuators are shipped at +5° (5° from full fail-safe) to provide automatic compression against damper gaskets for tight shut-off. When power is first applied, the AF24-ECON-R03 US will move to 0° (full fail-safe). The actuator will now try to close against the 0° position during its normal control operations.

The AF24-ECON-R03 US 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 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. Power consumption is reduced in holding mode.

## Installation

Refer to AF Section of the Standard Actuation and Accessories, Technical Documentation.

## Dimensions (Inches [mm])



M40024 - 05/10 - Subject to change. © Belimo Aircontrols (USA), Inc.

### Occupied - Economizer Mode

The AF24-ECON-R03 US enters Economizer Mode when either an external relay or controller completes the circuit between the actuator wire 3(Y1) and MA sensor. In this mode, the actuator moves proportionally to maintain a MA set-point of 55°F (fixed). A proportional band of 6°F modulates the actuator between 53 and 58°F. Also, a +/-1°F dead band eliminates hunting of the actuator, while maintaining suitable temperatures in the RTU mixed air chamber.

MA Dry Bulb Temperature	AF24-ECON... Position
< 53°F	Min. position
53°F < MAT < 58°F	Modulates between Min. Position and 100% open
> 58°F	100% open

Accessories, see page 308.

### 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 shaft up to a 1.05" diameter. Actuator shall deliver a minimum output torque of 133 in-lbs. The actuator must provide proportional damper control in response to a 3 kΩ NTC thermistor, 55°F setpoint. Actuator must have a built-in minimum position potentiometer. Actuator must have minimum position override via 0 to 10 VDC on wire 4. 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 independent of torque load. A 2 to 10 VDC feedback signal shall be provided for position feedback or master-slave applications. The actuator must be designed so that they may be used for either clock-wise or counterclockwise fail safe operation. Actuators shall be cUL Approved, have a 5 year warranty, and be manufactured under ISO 9001 International Quality Control Standards. Actuators shall be as manufactured by Belimo.

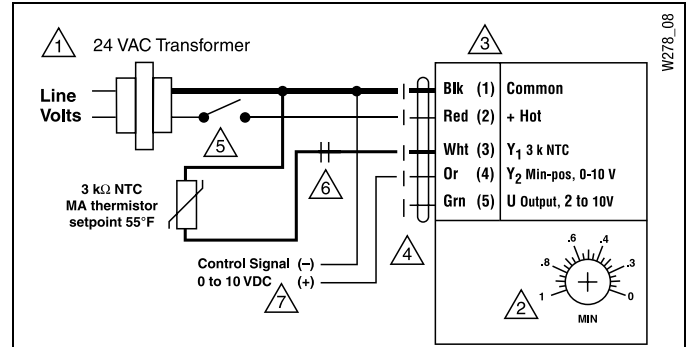
### Wiring Diagrams

#### INSTALLATION NOTES

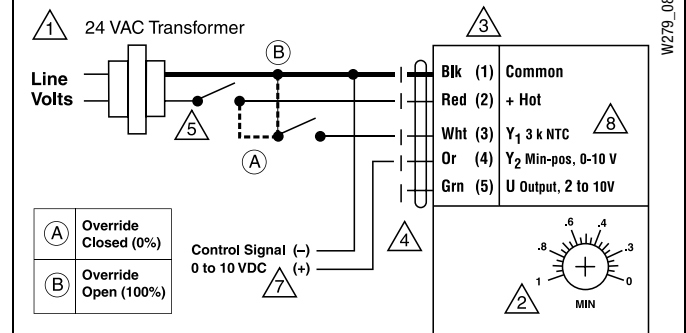
- 1 Provide overload protection and disconnect as required.
- 2 Min-position is adjustable from 0 to 100% with a potentiometer on the actuator cover.
- 3 Actuators with plenum rated cable do not have numbers on wires; use color codes instead.
- 4 CW (default) indicates that motor drive starts at zero position.
- 5 A relay or switch can spring return the actuator when the RTU fan de-energizes, or if low ambient temperature is sensed. A standard relay can be used to close the sensor circuit to engage economizer mode, e.g. outside air changeover device like a dry bulb or enthalpy limit switch.
- 6 A remote CO2 sensor or DDC controller with a 0 to 10 VDC output can change the standard relay can be used to open and close the sensor circuit. This device can be a relay or a dry bulb/enthalpy limit switch.
- 7 Override control for Y2 only accepts 0 to 10 VDC override control.

#### 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.



Standard Economizer Mode Wiring AF24-ECON-R03 US



Override for AF24-ECON-R03 US

### Override control

Wire	Input Signal	Position	Application
Y1	24 VAC	Drive closed (0%)	Morning warm-up cycle
Y1	Common	Drive open (100%)	Smoke Purge
Y1	Open wire	Drive to min position	Mechanical cooling in use, RTU thermostat calls for heat
Y2	0 VDC to 10 VDC	Min position of 0% to 100%	Override potentiometer via a remote CO2 sensor/controller or DDC controller