AFX24LON

LonWorks®, Proportional, Spring Return, 24 V

- **Torque min. 180 in-lb**
- **Feedback 2 to 10 VDC**

Application

Direct coupled actuators for direct link to LonWorks network. Actuators are easily installed by direct shaft mounting on air dampers in ventilation and air conditioning systems. Actuator can be controlled by any compatible LON system. For proportional modulation of dampers and control valves in HVAC systems. The AFX24LON provides mechanical spring return operation for reliable fail-safe application.

Operation

The AFX24LON 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 AFX24LON is mounted directly to control shafts up to 1.05" diameter by means of its universal clamp and anti-rotation bracket. A crank arm and several mounting brackets are available for damper applications where the actuator cannot be direct coupled to the damper shaft. The spring return system provides minimum specified torque to the application during a power interruption. The AFX24LON actuator is shipped at +5° (5° from full fail-safe) to provide automatic compression against damper gaskets for tight shut-off.

Technical Data	AFX24LON
Power supply	24 VAC, +/- 20%, 50/60 Hz 24 VDC, +20% / -10%
Power consumption running	8.5 W
Power consumption holding	3.5 W
Transformer sizing	11 VA (Class 2 power source)
Electrical connection	3 ft, 18 GA appliance cable, 1/2" conduit connector
Overload protection	electronic throughout 0 to 95° rotation
Feedback output U	2 to 10 VDC, 0.5 mA max
Torque	minimum 180 in-lb (20 Nm)
Direction of rotation spring	reversible with cw/ccw mounting
Direction of rotation motor	reversible with built-in switch
Mechanical angle of rotation	95° (adjustable with mechanical end stop, 35° to 95°)
Running time spring	<20 sec @ -4°F to 122°F [-20° C to 50° C]; <60 sec @ -22°F [-30° C]
Running time motor	150 seconds (default), variable (70 to 220 seconds)
Angle of Rotation adaptation	off (default)
Override control via nviManOvrd	min position = 0% mid. position = 50% max. position = 100%
Position indication	visual indicator, 0° to 95° (0° is spring return position)
Manual override	5 mm hex crank (3⁄16" Allen), supplied
Humidity	max. 95% RH, non-condensing
Ambient temperature	-22 to 122° F (-30 to 50° C)
Storage temperature	-40 to 176° F (-40 to 80° C)
Housing	NEMA 2, IP54, Enclosure Type 2
Housing material	zinc coated metal and plastic casing
Noise level	≤40dB(A) motor @ 150 seconds, run time dependent ≤62dB(A) spring return
Agency listings †	cULus acc. to UL60730-1A/-2-14, CAN/CSA E60730-1:02, CE acc. to 2004/108/EC & 2006/95/EC
Quality standard	ISO 9001
Servicing	maintenance free
Weight	4.3 lbs. (1.92 kg)

† Rated Impulse Voltage 800V, Type of action 1.AA (1.AA.B for -S version), Control Pollution Degree 3.

LonWorks®	
Certified	according to LonMARK® 3.3
Processor	Neuron 3120
Transceiver	FTT-10A, compatible with LPT-10
Functional profile	according to LonMARK® Damper actuator object #8110 open loop sensor object #1
LNS plug-in for actuator/sensor	can be run with any LNS based integration tool (min. for LNS 3.x)
Service button and status LED	according to LonMARK® guidelines
Conductors, cables	conductor lengths, cable specifications and topology of the LonWorks® network according to the Echelon® directives

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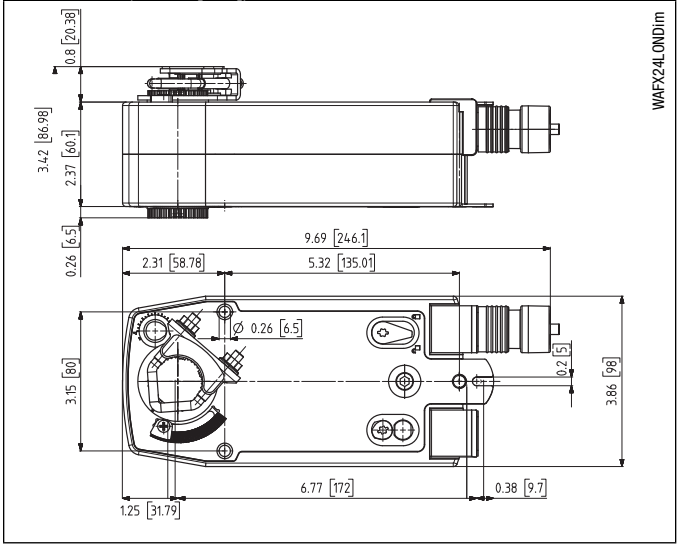
Dimensions (Inches [mm])



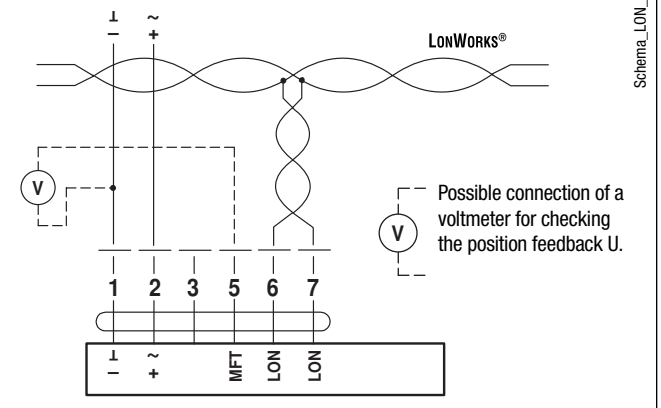
Accessories	
AV 8-25	Shaft extension
IND-AFB	Damper position indicator
KH-AFB	Crank arm
K7-2	Universal clamp for up to 1.05” dia jackshafts
TF-CC US	Conduit fitting
Tool-06	8mm and 10 mm wrench
ZG-100	Universal mounting bracket
ZG-101	Universal mounting bracket
ZG-102	Multiple actuator mounting bracket
ZG-118	Mounting bracket for Barber Colman® MA 3../4.., Honeywell® Mod III or IV or Johnson® Series 100 replacement or new crank arm type installations
ZG-AFB	Crank arm adaptor kit
ZG-AFB118	Crank arm adaptor kit
ZS-100	Weather shield (metal)
ZS-150	Weather shield (polycarbonate)
ZS-260	Explosion-proof housing
ZS-300	NEMA 4X housing

NOTE: When using AFX24LON actuator, only use accessories listed on this page.

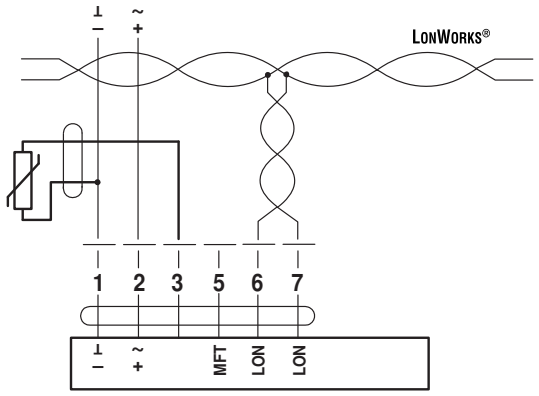
Typical Specification

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 proportional damper control in response to a LonWorks controller. The actuators must be designed so that they may be used for either clockwise or counterclockwise 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 Approved and have a 5 year warranty, and be manufactured under ISO 9001 International Quality Control Standards. Actuators shall be as manufactured by Belimo.

Wiring Diagrams



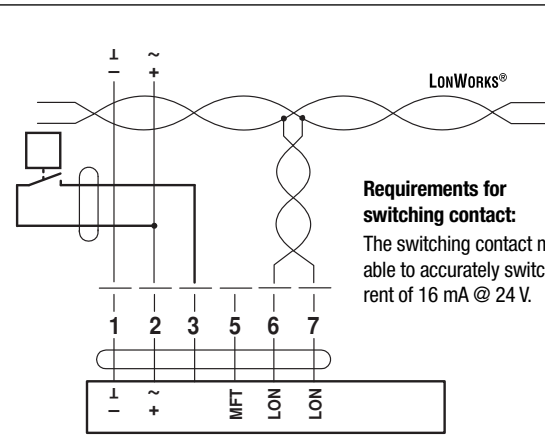
Connection without Sensor



Sensor scaling:
The sensors can be scaled with the sensor plug-in (sensor table).

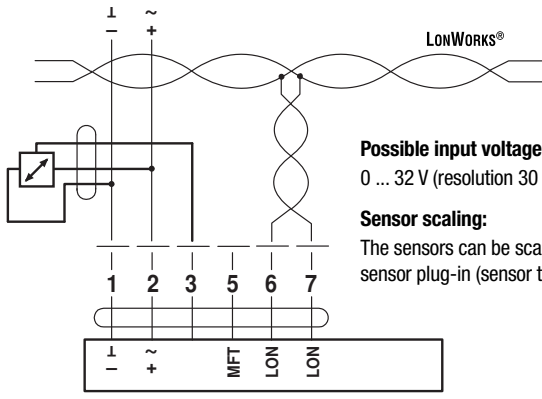
Sensor	Temperature range	Resistance range	Resolution
Ni1000	–28 ... +98°C	850 ... 1600 Ω	1 Ω
PT1000	–35 ... +155°C	850 ... 1600 Ω	1 Ω
NTC	–10 ... +160°C (depending on type)	200 ... 60 kΩ	1 Ω

Connection with Passive Sensor, e.g. Pt1000, Ni1000, NTC



Requirements for switching contact:
The switching contact must be able to accurately switch a current of 16 mA @ 24 V.

Connection with Switching Contact, e.g. Δp-monitor



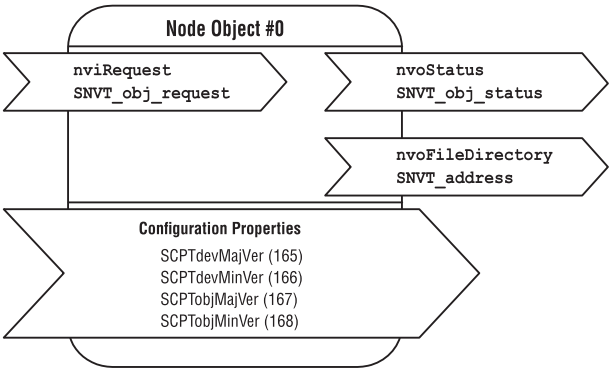
Possible input voltage range:
0 ... 32 V (resolution 30 mV)

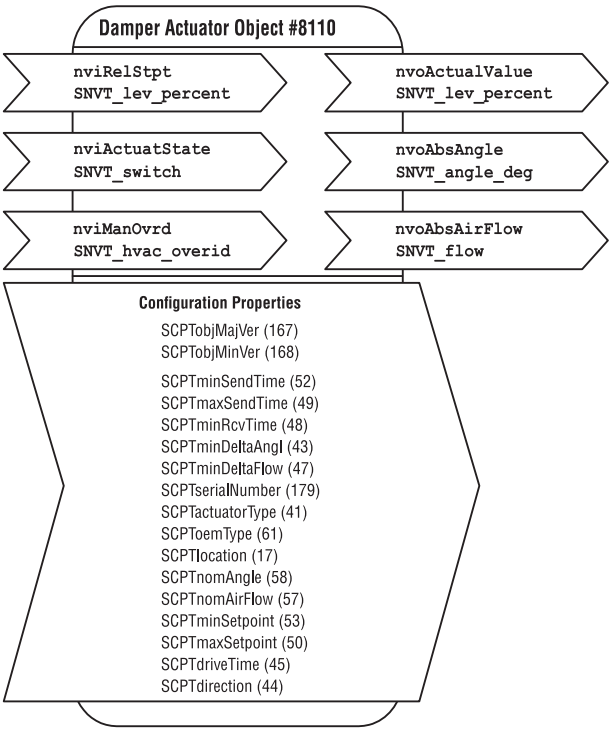
Sensor scaling:
The sensors can be scaled with the sensor plug-in (sensor table)

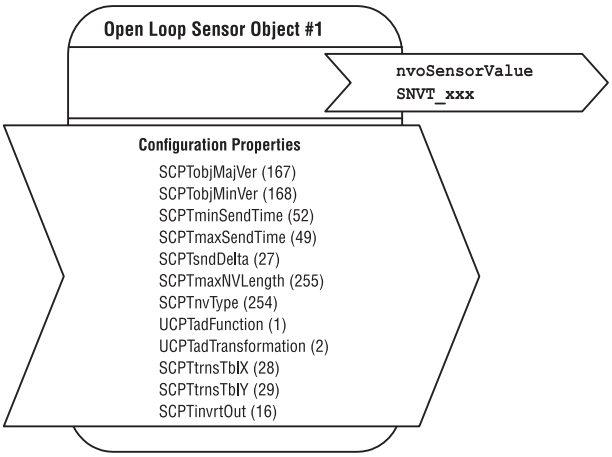
Connection with Active Sensor, e.g. 0...10 V @ 0...50° C

Functional Profile according to LonMARK®

The LON-capable damper actuator is certified by LonMARK®. The actuator functions are supplied with the LonWorks® network as standardized network variables according to LonMARK®. The Node Object #0, the Damper Actuator Object #8110 and the Open Loop SensorObject #1 are implemented in the actuator.







Node object #0
The node object contains the object status and object request functions.

nviRequest **SNVT_obj_request**
Input variable for requesting the status of a particular object in the node.

nvoStatus **SNVT_obj_status**
Output variable that outputs the current status of a particular object in the node.

nvoFileDirectory **SNVT_address**
Output variable that shows information in the address range of the Neuron chip.

Damper actuator object #8110
The actuator object is used to map the functions of the MP actuators to the LONWORKS® network.

nviRelStpt **SNVT_lev_percent**
The nominal position is assigned to the actuator via this input variable. This variable is normally linked to the output variable of an HVAC controller.

nviActuateState **SNVT_switch**
A preset position is assigned to the actuator via this input variable. Note on priority: The last variable that was active, either nviActuatorState or nviRelStpt, has priority.

nviManOvrd **SNVT_hvac_overid**
These input variables can be used to manually override the actuator into a particular position.

nvoActualValue **SNVT_lev_percent**
This output variable shows the current actual position of the actuator and can be used for control circuit feedback or for displaying positions.

nvoAbsAngle **SNVT_angle_deg**
This output variable shows the current angle of rotation of the actuator

or the valve and can be used to display the position or for service purposes.

nvoAbsAirFlow **SNVT_flow**
This output variable is inactive with the SR24ALON-5 rotary actuator and shows a constant value of 65535 (this variable is only active in conjunction with LON-capable VAV controllers).

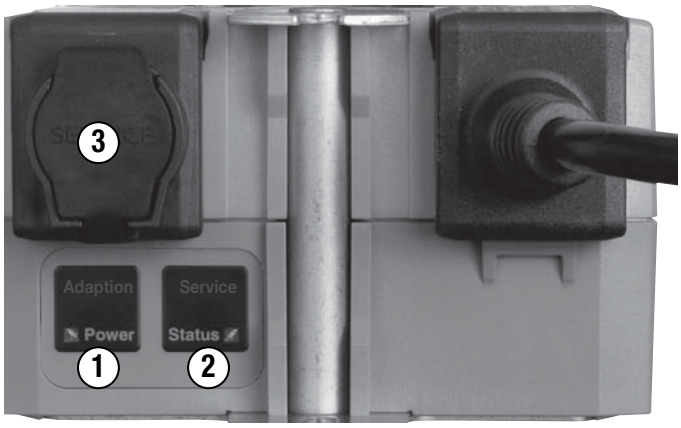
Open loop sensor object #1
A sensor can be connected to the rotary actuator. A passive resistance sensor (e.g. Ni1000), an active sensor (output 0 ... 32 V) or a switch (on/off) can be connected. The open loop sensor object transfers the measured sensor values to the LONWORKS® network.

nvoSensorValue **SNVT_xxx**
This output variable shows the current sensor value. Depending on the connected sensor, the output variable can be configured via the sensor plug-in and specifically adapted to the system.

The SNVT_... can be configured as:		
SNVT_temp_p	SNVT_lev_percent	SNVT_lux
SNVT_temp	SNVT_abs_humid	SNVT_press_p
SNVT_switch	SNVT_enthalpy	SNVT_smo_obscur
SNVT_flow	SNVT_ppm	SNVT_power
SNVT_flow_p	SNVT_rpm	SNVT_elec_kwh

Notes

Detailed information on the functional profiles can be found on the website of LonMARK® (www.lonmark.org).



1	**Membrane key and green LED display**	
	Off	No voltage supply or malfunction
	On	Operation
	Press button	Switches on angle of rotation adaption followed by standard operation
2	**Membrane key and yellow LED display**	
	Off	The actuator is integrated ready-for-operation in the LONWORKS® network.
	On	No application software is loaded in the actuator.
	Blinking (flashing interval 2 seconds)	The actuator is ready-for-operation, but not integrated in the LONWORKS® network (unconfigured).
	Other flashing codes	A fault is present in the actuator.
	Press button	Service Pin Message will be sent to the LONWORKS® network.
3	**Service plug**	
	For connecting MFT parameterizing and service tools	

Operating Controls

The hand crank, interlocking switch and direction of rotation switch are provided on both sides.