

INVENSYS.® General Instructions

MU-12313
Electronic Gear Train
Economizer Actuator

APPLICATION

For modulating operation of dampers and other equipment which require the return to normal position upon power interruption. Adjustable minimum position control 0° to 90°. Replaces Honeywell M-7415A and functionally replaces White-Rodgers 3420-4.

SPECIFICATIONS

Control Circuit: Two-wire.

Mixed or Discharge Air Sensor: Thermistor (8" long) with 1/4" male quick connectors and integral mounting flange; 10K ohms at 77°F (25°C), negative temperature coefficient. Supplied with actuator.

MA (Mixed Air) Setpoint: Dial adjustable 40 to 65°F (4 to 18°C); factory set at 55°F (18°C).

Throttling Range: Factory set; see Table 1.

Power Supply: 24 Vac, Class 2 (+10, -15% for 0 to 90° travel; +10, -10% for 90 to 180° travel), 60 Hz, 24 Vac, Class 2 (+10, -10%), 50 Hz.

VA:

Running, 14.4.

Holding, 9.6.

Watts:

Running, 14.2.

Holding, 9.2.

Torque:

Rated, 25 lb.-in. (2.8 N-m).

Limit, 40 lb.-in. (4.5 N-m) under stall conditions.

Maximum Damper Size*:

Parallel, 14 ft² (1.3 m²).

Opposed, 18 ft² (1.7 m²).

*Damper ratings are nominal and based on standard (not low leakage) dampers at 1" (25.4 mm) W.C. pressure and 2000 FPM (1.0 m/s)

Shaft Output: Dual output; either shaft can be used if torque limit is not exceeded.

Shaft Rotation: CCW when power is applied. (The front of the actuator is defined as the right end when facing the field wiring terminals.) Maximum shaft rotation field adjustable 75°, 90°, 110°, 160°, 180°. factory set 90°. When used with 50 Hz power supply, rotation is limited to 75° or 90° adjustments.

Minimum Position: Factory set 22°. Dial adjustable 0° to 90°.

Timing:

Powered, 28 sec./90°.

Spring Return, 18 sec./90°.

Environment:

Ambient Temperature Limits,

Shipping and Storage -40 to 160°F (-40 to 71°C).

Operating -40 to 140°F (-40 to 60°C).

Humidity, 5 to 95% RH, non-condensing.

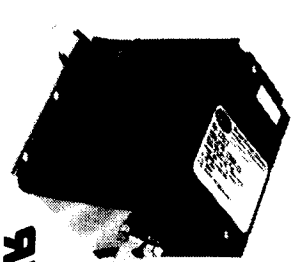
Locations, NEMA Type 1 when mounted in any position; NEMA Type 3R when mounted in vertical position only and AM-219 kit installed.

Vibration, Maximum 1G in any plane.

Wiring Connections: Side mounted #6 self tapping screw/1/4" tab.

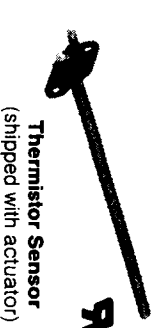
Case: Glass reinforced thermoplastic (PET) cover, plated steel base.

Mounting: Any position. Five 9/32" (7.1 mm) mounting holes provided.



MU-12313

(Front of actuator is defined as the right end when facing the field terminal connections.)



Thermistor Sensor
(shipped with actuator)



AD-931-105
External Minimum Positioner

TABLE 1. THROTTLING RANGES†

Degree Rotation	T.R. as Factory Supplied °F (°C)	T.R. with Jumper J1 Removed °F (°C)
75	7 (3.8)	3.5 (1.9)
90	8 (4.4)	4 (2.2)
110	10 (5.5)	5 (2.8)
160	14 (7.2)	7 (3.8)
180	16 (8.9)	8 (4.4)

†Number of degrees change required at the sensor in order to produce the maximum rotation of the actuator output shaft.

Crank Arm for Actuator: AM-112 included with actuator, 3/8" (9.5 mm) slot provides for adjustable radius from 7/8" (22 mm) to 3-1/8 (79 mm)

Dimensions: 5-1/2" high x 5" wide x 7-9/32" deep (140 mm x 127 mm x 185 mm). 3/8" (9.5 mm) shaft diameter.

ACCESSORIES

AD-931-105 External minimum positioner

Damper Linkage Accessories:

AM-111 Crank arm for 5/16" diameter damper shaft

AM-219 Crank arm for 3/8" diameter damper or MU-12313 actuator shaft

AM-113 Crank arm for actuator or 1/2" diameter damper shaft

AM-115 Crank arm for 7/16" diameter damper shaft

AM-122 Linkage connector straight type

AM-123 Damper clip

AM-125 5/16" diameter x 20" damper rod

AM-125-048 5/16" diameter x 48" damper rod

AM-132 Ball joint connector

AM-219 Conduit cover kit

AM-221 1 SPDT switch kit

AM-222 2 SPDT switch kit

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THEORY OF OPERATION

The built-in actuator controller receives a thermistor sensor input. The controller will cause the output shaft to position to maintain the set temperature. The minimum positioner will maintain a minimum output shaft rotation when the sensed temperature calls for less rotation.

PRE-INSTALLATION

Inspection

Visually inspect the carton for damage. If damaged, notify the appropriate carrier immediately. If undamaged, open the carton and visually inspect the device for obvious defects. Return damaged or defective products.

Required Installation Items

- Wiring diagrams
- Tools (not provided):
Volt-ohm meter
Appropriate screwdriver for mounting screws
- Appropriate drill and drill bit for mounting screws
- Appropriate accessories
- Mounting screws (not provided)

INSTALLATION

CAUTION

1. Installer must be a qualified, experienced technician.
2. Disconnect power supply before installation to prevent electrical shock and equipment damage.
3. Make all connections in accordance with the wiring diagram, and in accordance with national and local electrical codes. *Use copper conductors only.*
4. Do not exceed ratings of the device.

Mounting

LOCATION — ACTUATOR

CAUTION

NEMA Type 1 indoor only when mounted in any position; NEMA Type 3R outdoor when mounted in vertical position only and AM-219 kit installed.
Do not install actuator or sensor in locations where corrosive fumes or explosive atmospheres are present.

The actuator can be mounted in any position in a weather protected area. Five 9/32" (7.1 mm) mounting holes are provided in the base of the actuator (see Figure 1). Two (2) mounting screws on right side and one (1) screw on left side of actuator are the minimum number of required fasteners. Locate the actuator as close to the damper as possible. (See Figure 1 for mounting dimensions.)

LOCATION — SENSOR FLANGE

1. Select mounting location on duct.
2. Drill 3/8" (10 mm) insertion hole in duct.
3. Insert sensor through duct wall and drill two (2) 1/8" (3 mm) holes.
4. Fasten sensor flange with two (2) sheet metal screws (#8 x 1.2" slotted head Type A screws recommended) using flange as a template. (See Figure 2 for mounting dimensions.)

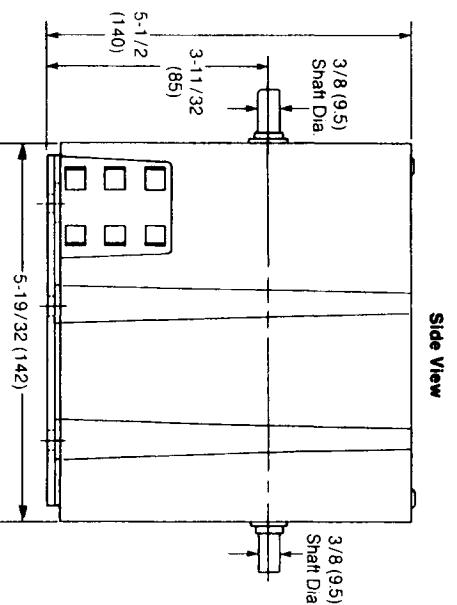
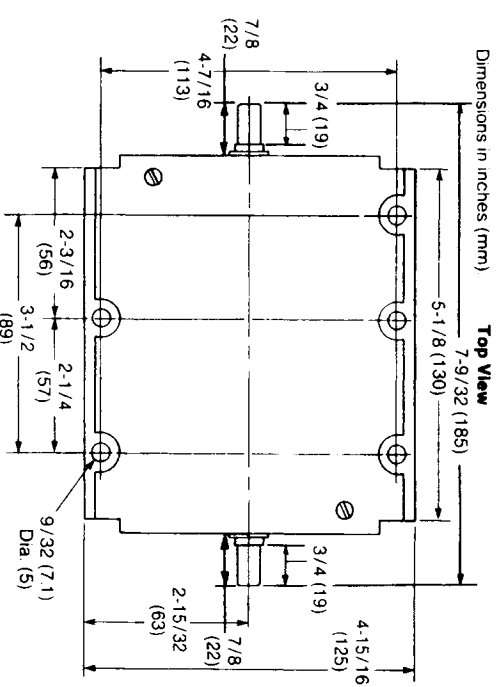


Figure 1. MU-12313 Dimensions

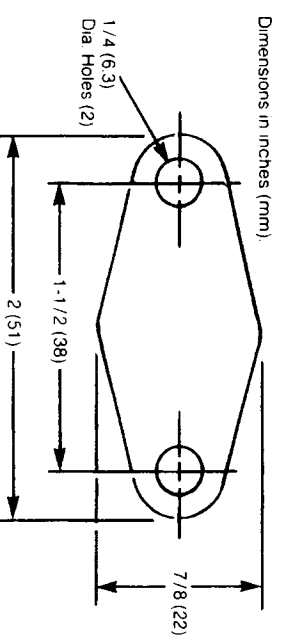


Figure 2. Sensor Flange Dimensions

CHECKOUT

After the entire system has been installed, the following check for proper operation can be made (see Figures 3 through 5):

1. Be sure that the system power is connected to TR and TR1.
2. Open circuit between T & T1 and open between P & P1 (if external minimum positioner is used) will cause the output shaft to rotate full CW position with minimum position set-point dial in any position. The internal spring will return the output shaft CW to 0° when the actuator is de-energized.
3. Open circuit between T & T1 and jumper between P & P1. The actuator shaft will travel to minimum position, factory set at 22°.
4. Jumper between T and T1 shaft will rotate to full CCW position.
5. If sensor is connected to T and T1 and the output shaft fails to rotate in response to sensed conditions within the three-

ting range of the controller, the continuity of the sensor should be checked. 10K ohms at 77°F (25°C).

6. Be sure there is no binding of the linkage at any point in the stroke.
7. If the output shaft fails to rotate, check the field wiring to insure proper voltage supply.

MAINTENANCE

Regular maintenance of the total system is recommended to assure sustained optimum performance.

FIELD REPAIR

Replace a defective actuator with a functional unit (thermist sensor shipped with actuator). Thermist sensor replacement part number BDHE-55.

Wiring

GENERAL WIRING INFORMATION

TABLE 2. SENSOR OR EXTERNAL MINIMUM POSITION ADJUSTOR LEAD LENGTHS

Wire Size AWG	Maximum Run Ft. (m) (1 run has two wires)
22	400 (122)
18	1000 (305)
16	1588 (484)
14	2563 (781)

TABLE 3. INPUT/OUTPUT TERMINAL DESIGNATIONS

Terminal	Designation
T	To sensor lead
T1	To sensor lead
P1	Jumper to P; to Yel/Blk lead of AD-931-105 if used
P	Jumper to P1; to Blue lead of AD-931-105 if used
TR	To 24 Vac
TR1	To 24 Vac

TYPICAL WIRING

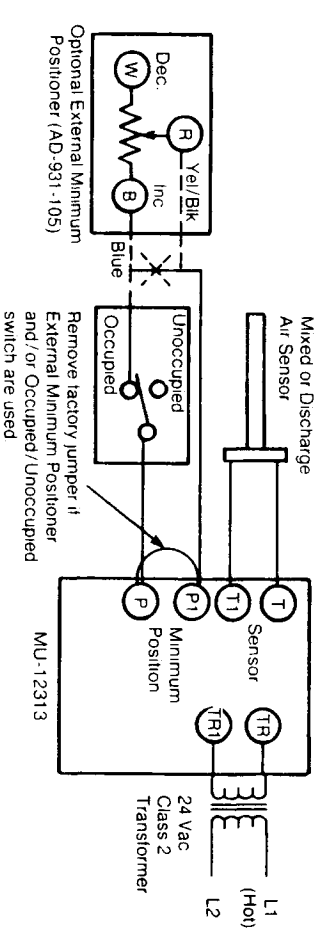
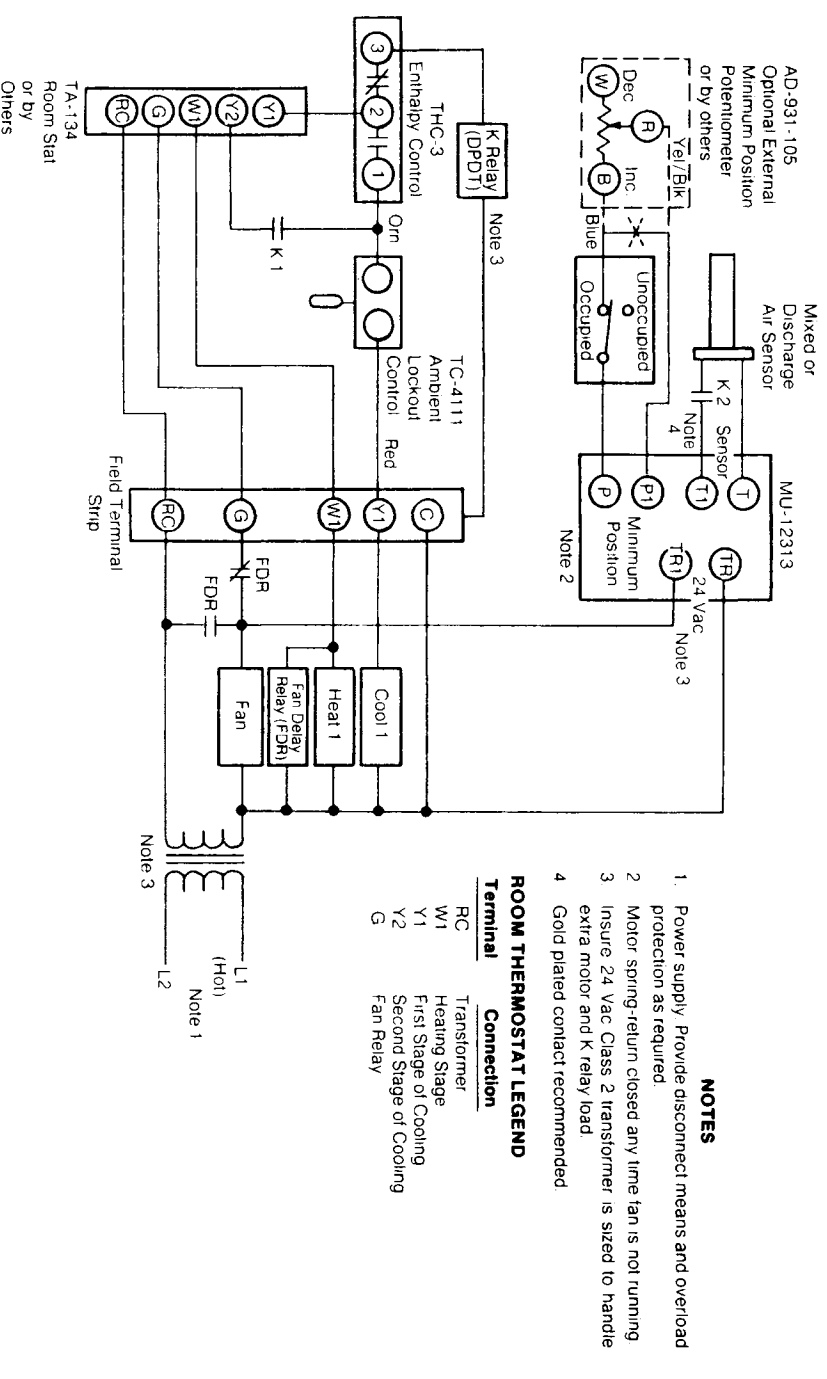


Figure 3. Typical Wiring for MU-12313



NOTES

1. Power supply. Provide disconnect means and overload protection as required.
2. Motor spring-return closed any time fan is not running.
3. Insure 24 Vac Class 2 transformer is sized to handle extra motor and K relay load.
4. Gold plated contact recommended.

ROOM THERMOSTAT LEGEND

Terminal	Connection
RC	Transformer
W1	Heating Stage
Y1	First Stage of Cooling
Y2	Second Stage of Cooling
G	Fan Relay

Figure 4. Single-Stage Cooling System with Modulating Economizer

