SIEBE ENVIRONMENTAL CONTROLS

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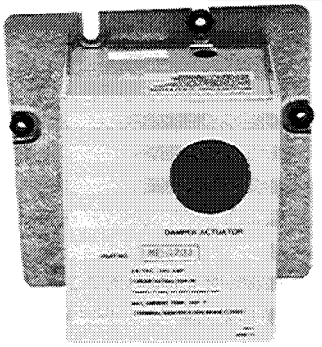
MF-1233 Series

Reversible Floating Electric Actuators
General Instructions



APPLICATION

For floating control of small dampers which do not require the return to normal position upon power interruption. Typically, the actuator is used with terminal units in VAV systems and with mixing boxes in constant volume double duct systems.

SPECIFICATIONS

Control Type: Reversible floating.

Control Circuit: Three-wire, provided by SPDT floating switch with a neutral center. This switching action is available with the PF-300 Series air flow controllers, TF-1111 floating neutral center thermostat, compatible with the input requirements of the MF-1233 actuator.

Power Requirements:

Volts, 24 (+10%, −15%).

Hz, 50/60.

Full Load Amps, 0.160.

Torque: 20 lb.-in. (2.3 N-m). The damper must withstand 35 lb.-in. (4.0 N-m) of torque if the travel is less than the fixed actuator stroke as set by the internal torque switches.

Maximum Damper Size:

Parallel, 11.2 ft² (1.0 m²).

Opposed, 14.4 ft² (1.3 m²).

Damper ratings are nominal and based on standard (not low leakage) dampers at 1" (25.4 mm) W.C. pressure and 2000 FPM (10 m/s) velocity.

Output Shaft:

Rotation, 90° (+5, −0°). Factory set CCW end (as viewed from cover side of actuator). Torque switches limit travel in CW and CCW directions, reducing the need for travel adjustment and preventing over stress on dampers.

Construction, Hollow, for mounting over 1/2" (12.7 mm) shaft.

No Load Timing: 3 min. 45 sec. nominal.

Auxiliary Switch: Adjustable SPDT; see Table 1 for models.

Auxiliary Potentiometer: 15K ohm 0.33 watts, typically used for position indication; see Table 1 for models.

FCC: Complies with Class B testing according to the rules and regulations of part 15 radio frequency devices (including television), sub part J, computing devices.

Environment:

Ambient Temperature Limits,
Operating, Shipping and Storage
−40 to 140°F (−40 to 60°C).

Humidity, 5 to 95% RH, non-condensing

Locations, NEMA Type 1 indoor only.

Vibration, 1G maximum in any plane.

Connections: Coded screw terminals that will accept up to 16 gage wire.

Case: Galvanized steel.

Mounting: Any position. The actuator mounts over a 1/2" (12.7 mm) diameter damper shaft [min. length 1-1/8" (29 mm)]. Crank arm and damper rod mounting applications require ordering separately AM-165 mounting kit, AM-125-XXX damper rod, AM-122, AM-132 connectors and damper shaft crank arm.

Dimensions: 5-1/8" high × 5-1/4" side × 3-1/4" deep (130 mm × 133 mm × 83 mm).

TABLE 1. MODEL IDENTIFICATION

Part Number	Duty Cycle	SPDT Aux. Switches (Adj.)*	Aux. Pot** 15K ohm .33 watt
MF-1233	50%	None	None
MF-1233-002		2	None
MF-1233-010		None	1
MF-1233-012		2	1

*5 amps @ 24V DC/AC 50/60 Hz. Pilot duty 100 VA. Switches have gold contacts suitable for dry circuit switching.
**Typically used for position indication.

ACCESSORIES

AM-111 Crank arm for 5/16" (7.9 mm) diameter damper shaft
AM-112 Crank arm for 3/8" (9.5 mm) diameter damper shaft
AM-113 Crank arm for 1/2" (12.7 mm) diameter damper shaft
AM-115 Crank arm for 7/16" (11.1 mm) diameter damper shaft
AM-122 Linkage connector, straight type
AM-125 5/16" (7.9 mm) diameter × 20" (508 mm) damper rod
AM-132 Linkage connector, ball type
AM-165 Mounting kit, includes crank arm, 1/2" (12.7 mm) diameter shaft and bearing mounting bracket

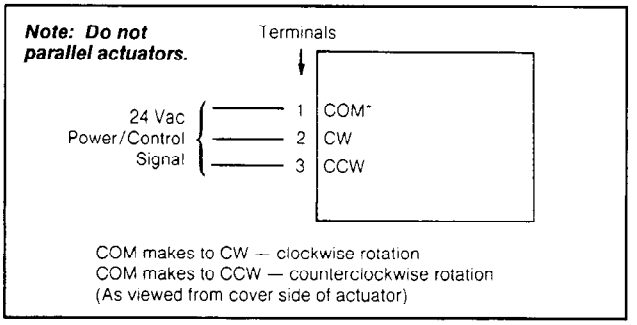


Figure 1. Switching Action & Terminals Typical of All Models

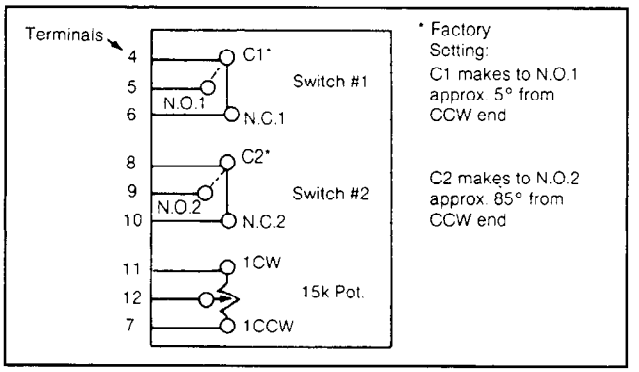


Figure 2. Auxiliary Switches and 15K Pot. Action & Terminals, See Table 1 for Aux. Components & Model #'s

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 damage due to shipping. Return damaged products.

MF-1233 series actuators are shipped with mounting screws. Actuators may be connected to power supply to check operation prior to installation. See operation and checkout.

Required Installation Items

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

INSTALLATION

CAUTION

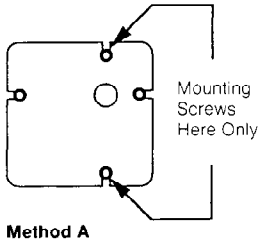
1. Installer must be a qualified, experienced technician.
2. Disconnect power supply before installation to prevent electrical shock and equipment damage.
3. Make all connections in accordance with the wiring diagram, and in accordance with national and local electrical codes. *Use copper conductors only.*
4. Do not exceed ratings of the device.
5. Avoid locations where corrosive fumes, vapors, abrasive dust or explosive conditions or where high RFI/EMI generating devices are present. NEMA Type 1 covers are intended for indoor use primarily to provide a degree of protection against contact with the enclosed components.

Direct Mounting (See Figure 3)

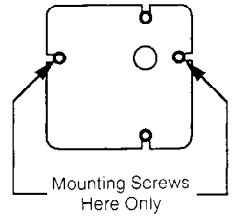
1. Remove actuator cover by removing cover screw and prying outward on the two legs of the cover.
2. Rotate the damper shaft to a position that allows the damper to fully open or close in 90° of CW rotation.
3. Slide the actuator over the damper shaft until the mounting grommets contact the duct or mounting surface.

CAUTION

a. Mount actuator with only two (2) screws.
b. Grommets and spacers must be on opposite sides of the damper shaft.
c. Mount per method A or B shown below.
d. Warranty is void if actuator is mounted with three (3) or four (4) screws and not mounted per method A or B shown below.



Method A



Method B

4. Drill (2) two 1/8" (3.1 mm) dia. pilot holes through the duct using the actuator grommet centers as a template. An alternate method to locate the pilot holes is to refer to the Mounting Dimensions, Figure 3.

CAUTION

Binding between the mounting surface and the base of the actuator will restrict the torque limiting feature and could damage the actuator.

5. Secure the actuator using the (2) two #8 × 1/2" slotted hex head Type A sheet metal screws and grommets provided.

CAUTION

The use of only one mounting screw or failure to use grommets may cause internal damage to the actuator.

6. Tighten the (2) two set screws on the damper shaft using standard 1/8" right angle Allen wrench (see Figure 3). The hollow actuator shaft also has (2) two keyways sized for a 1/8" (3.1 mm) wide key projecting 1/16" (1.5 mm) from the damper shaft. The keyways are located on left and right side of actuator shaft when the actuator is upright and in the CCW end of rotation.
7. Reassemble the actuator cover and cover screw. In the event the damper shaft protrudes more than 3-5/16" (84 mm), remove the paper disk covering the damper shaft hole in the cover so the shaft can extend through.
8. The actuator is mounted.

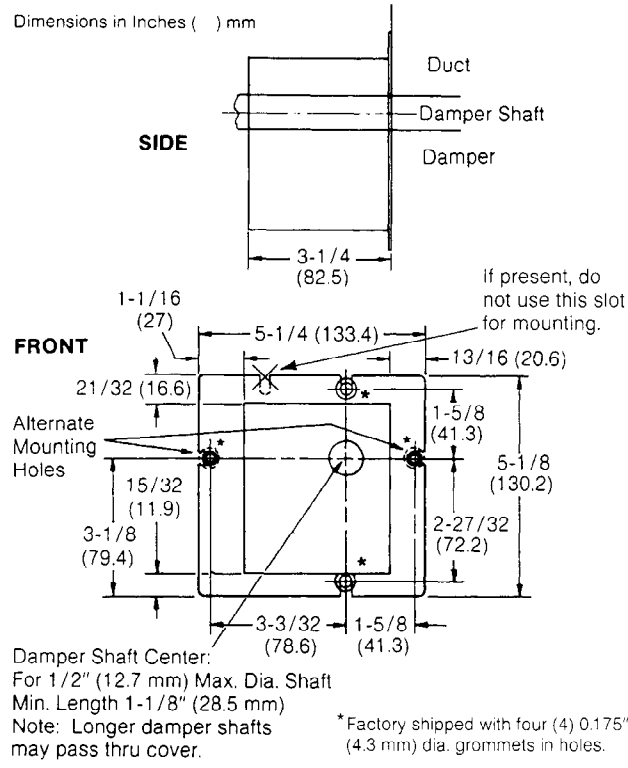


Figure 3. Mounting Dimensions

Remote Mounting (See Figure 4)

AM-165 kit and damper shaft crank arm, connectors and damper rod are ordered separately. Mounting instructions are provided with AM-165 kit.

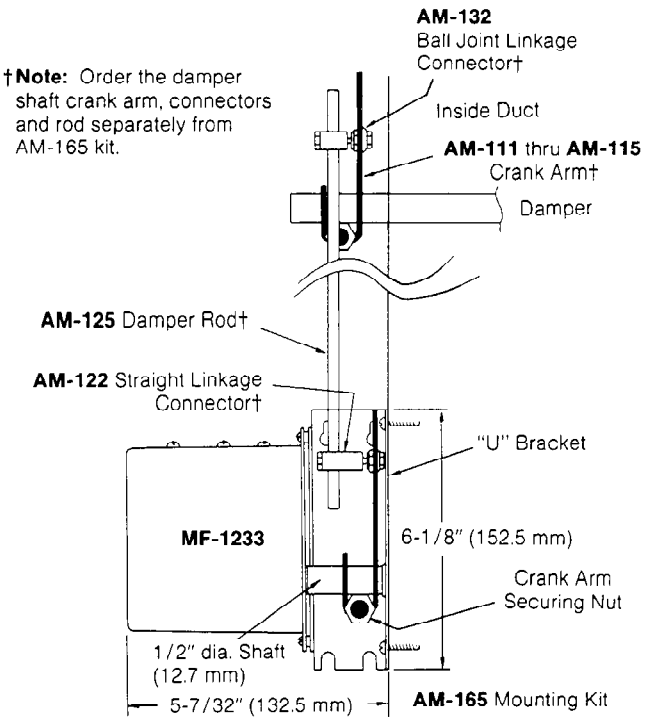


Figure 4. Remote Mounting with AM-165 Kit

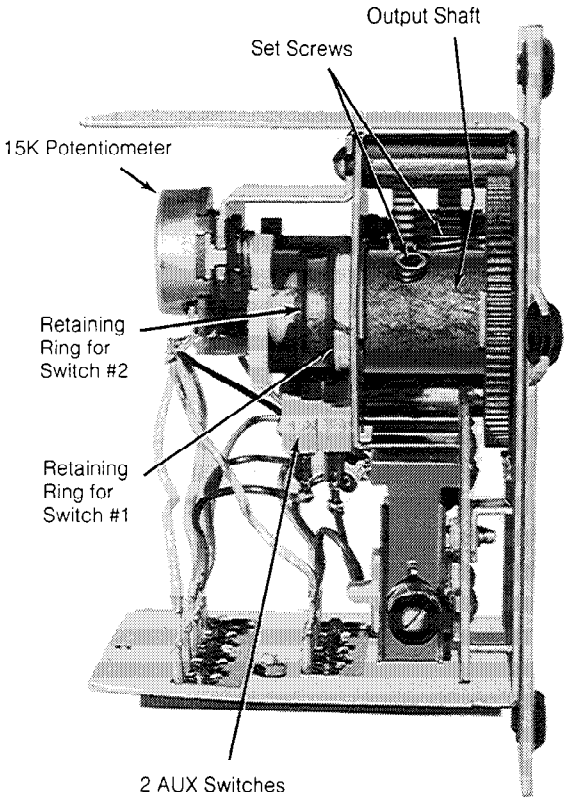


Figure 6. MF-1233-012 R.H. Side without Cover

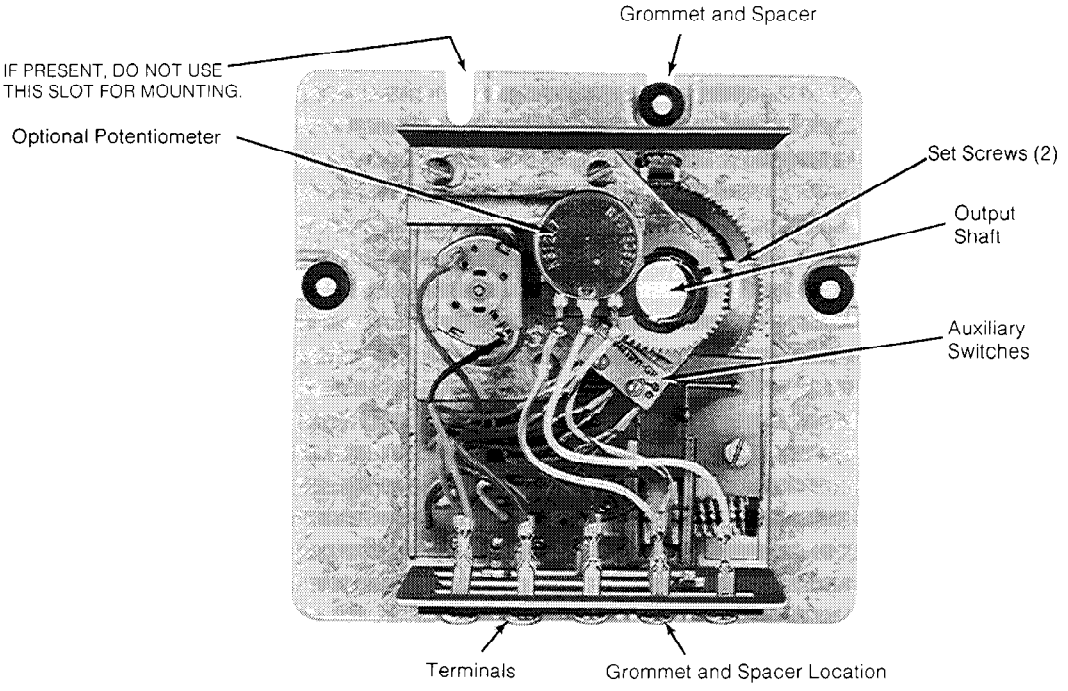


Figure 5. MF-1233-012 Front without Cover

WIRING

Make all electrical connections in accordance with the job wiring diagram and in compliance with national and local electrical codes. See Figure 7.

CAUTION

Provide at least 6" (152 mm) "slack" in all the leads to allow the actuator housing to move slightly for torque switch operation.

Power/Control Leads Use 18 ga. 3-conductor twisted leads (Barber-Colman Number W-103) up to 500 ft. (152.4 meters) between the controller and actuator. Use a larger wire size for longer runs.

Auxiliary Switch Leads Use 18 ga. 3-conductor (W-103) or 2-conductor twisted leads (Barber-Colman Number W-102) up to 15 ft. (4.5 meters) when carrying 5 amps or per the table.

TABLE 2. AUXILIARY SWITCH LEAD LENGTHS

Amps @ 24 Volts	18 Gauge W-103 or W-102 Wire Run Ft. (Meter)
4	19 (5.7)
3	25 (7.6)
2	38 (11.5)
1	75 (22.8)
0.5	150 (45.7)
0.25	300 (91.4)

Potentiometer Leads Use 18 ga. 3-conductor twisted wire (W-103) up to 1000 ft. (304.8 meters) between the potentiometer and the indicating device.

No electrical circuit in the MF-1233 Series actuators is grounded to the case.

Refer to the application data for additional wiring information, Figures 8 through 13.

AUXILIARY SWITCH ADJUSTMENT

(See Figures 5 and 6)

Switch adjustment is made by turning the retaining ring which actuates the switch. Use a thin nosed pair of pliers [1/4" (6.3 mm) thick max.] to rotate the ring in either direction. Run the actuator to the position that the switch is to make; i.e., the switch lever is depressed making the C contact to the N.O. contact.

Switch #1 Rotate the ring CCW until the first lobe on the ring to contact the switch lever makes the switch.

Switch #2 Rotate the ring CW until the first lobe on the ring to contact the switch lever makes the switch. This switch may also be set closer to the CW end if desired.

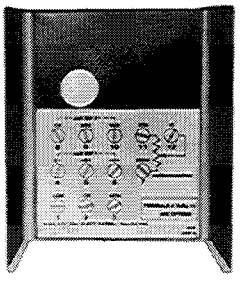


Figure 7. MF-1233 Series Terminal Designation in Cover

OPERATION

24 Vac is applied to the #1 and #2 actuator terminals. Integral circuitry rectifies the 24 Vac power/control signal to control a DC reversible motor. The actuator output shaft drives the damper shaft CW until the torque switch breaks the power to the motor at 90° rotation [or when the damper torque exceeds 30-35 lb-in. (3.4-3.9 N.m)]. The actuator will stop and stay at any position within the stroke when the power to terminals #1 and #2 is removed. When 24 Vac is applied to the #1 and #3 actuator terminals, the actuator output shaft rotates CCW and performs as described above.

CHECKOUT

Use a 20,000 ohm per volt V.O.M.

Rotation Check Apply 24 Vac (.16 amps) to terminals #1 and #2. The unit must run CW 90° and stop. The voltage at the red (+) and black (−) motor leads must be approximately 7 Vdc or the unit is defective and must be replaced.

Apply 24 Vac (.16 amps) to terminals #1 and #3. The unit must run CCW 90° and stop. The voltage at the red (−) and black (+) motor leads must be approximately 7 Vdc or the unit is defective and must be replaced.

Auxiliary Switch Check (when used) (see Figure 6) Use a volt-ohm meter at the proper terminals. There must be a circuit from C to N.O. on each switch when the switch lever is depressed. When not depressed, there must be a circuit from C to N.C. If this action is not present, the switch must be replaced.

Potentiometer Check (when used) (see Figures 5 and 6) Use a volt-ohm meter. There must be approximately 15K ohm resistance between terminals 11 and 7. The resistance between terminals 7 and 12 must steadily increase to 15K ohm as the actuator rotates CW 90°. If these conditions do not exist, the potentiometer must be replaced.

CAUTION

This device is limited to 50% duty cycle. To achieve maximum service life, check the system to verify proper operation. The actuator shaft should not be continuously moving. After initial start-up and system stabilization, the actuator shaft should be moving less than 50% of the time. Exceeding 50% duty cycle limit will result in reduced life.

NOTE

If the actuator shaft is continuously moving, the system may be "hunting." System instability or "hunting" can be caused by:

- Throttling range too narrow
- Integral term set too fast
- Large temperature fluctuations caused by external influences at the sensor (e.g., fork lift truck exhaust, open garage doors)
- Oversized valves or mechanical equipment
- Other control strategies which may cause continuous actuator movement

MAINTENANCE

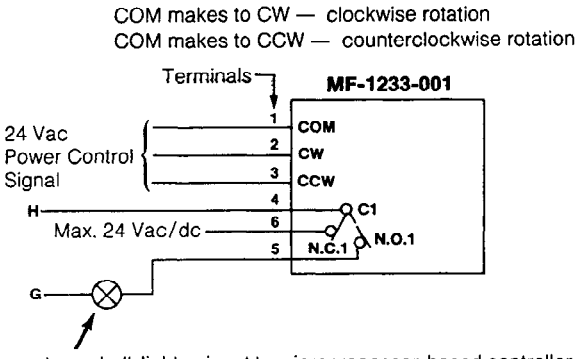
Regular maintenance of the total system is recommended to sustain optimum performance.

Normally, no lubrication is required, but use #10 motor oil on the bearing and gears if the factory lubricant becomes thick with dust or grit.

FIELD REPAIR

None. Replace with a functional actuator.

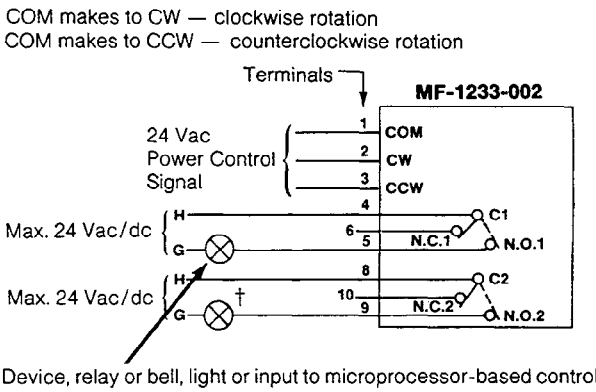
APPLICATION DATA



Device, relay or bell, light or input to microprocessor-based controller in an energy mangement system.

The auxiliary switch may be readjusted 5° from the CCW end to the CW end or at any point between.

Figure 8. Actuator with One Auxiliary Switch for Position Indication



Device, relay or bell, light or input to microprocessor-based controller in an energy mangement system.

The auxiliary switch may be readjusted 5° from the CCW end to the CW end or at any point between.

†2-position heating/cooling device. Switch #2 may be readjusted from 85° from the CCW end to the CW or CCW end or at any point between.

Figure 9. Two Auxiliary Switches for Actuator Indication and Heating or Cooling Applications

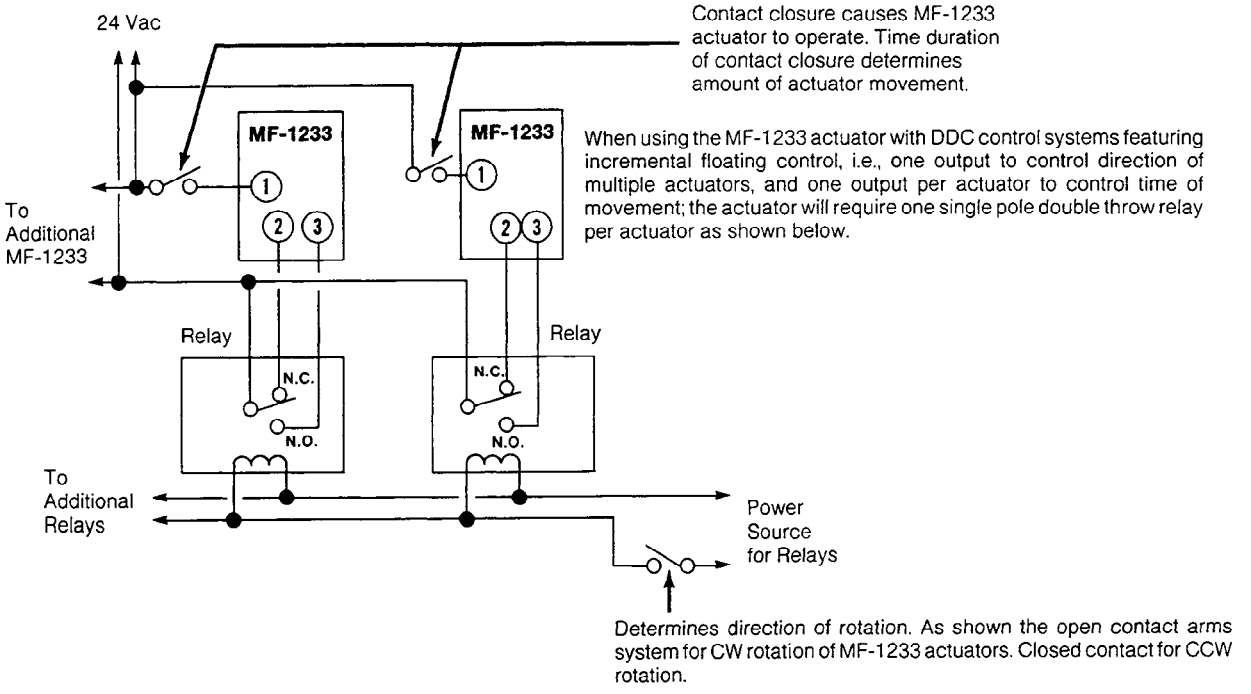
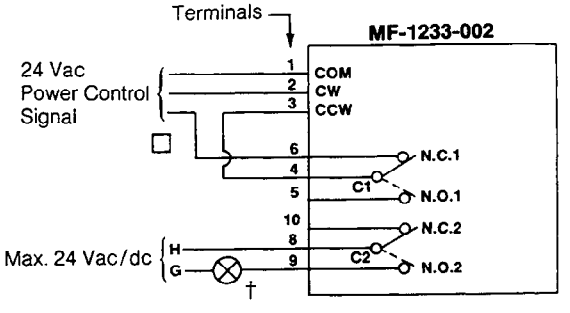


Figure 10. DDC Control System Using Two or More MF-1233's



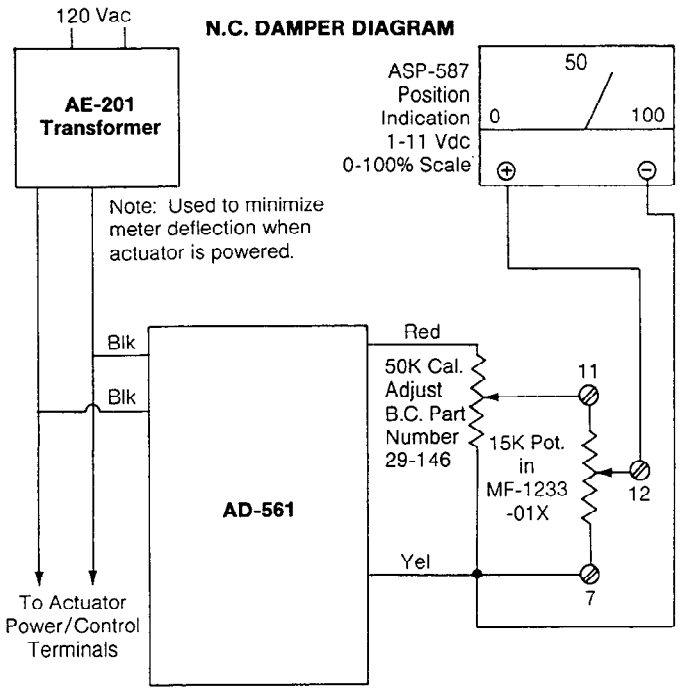
COM makes to CW — clockwise rotation
COM makes to CCW — counterclockwise rotation

†2-position heating/cooling device. Switch #2 may be set at either end of stroke or anywhere between.

□ Using switch #1, field set to establish any actuator position in the CCW direction. The switch may also be used to establish a CW limit of travel by breaking the CW-COM signal in lieu of the CCW-COM.

Figure 11. Two Auxiliary Switches for an Adjustable CCW Position and Heating or Cooling Applications

APPLICATION DATA (Cont.)



Calibration N.C. Damper

1. Position calibration adjustment potentiometer (50K pot.) to mid-position.
2. Run actuator to full CCW (closed) end of rotation.
3. Rotate cal. adjustment until the position indication meter reads "0%".

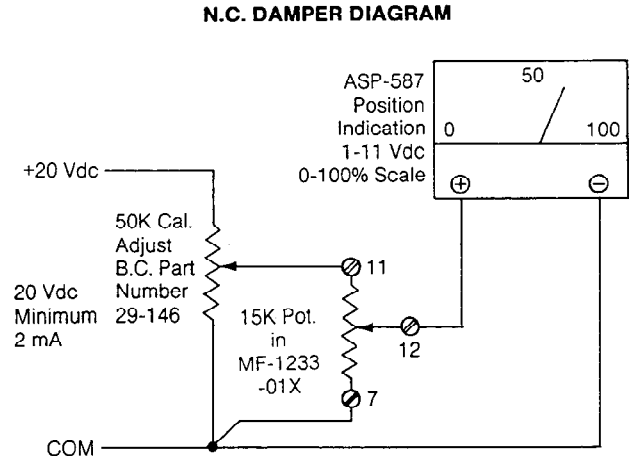
Calibration N.O. Damper

1. Position calibration adjustment potentiometer (50K pot.) to mid-position.
2. Run actuator to full CW (closed) end of rotation.
3. Rotate cal. adjustment until the position indication meter reads "100%".
4. Disconnect terminal #7 from Yel wire and terminal #11 from wiper of cal. adjust pot. Reconnect terminal #7 to wiper of cal. adjust pot. and terminal #11 to Yel wire junction.
5. Loosen clamp screw on large feedback potentiometer gear (some units will not have clamp screw — proceed to step 6). See Figure 4.
6. Rotate large feedback potentiometer gear, (on hub) inside the actuator, by hand or with thin screwdriver in gear slot until the position indication meter reads "0%".
7. Tighten clamp screw [2 lb.-in. (.2 N-m)] on large feedback potentiometer.

CAUTION

Do not loosen potentiometer bracket screws. Warranty will be voided if potentiometer bracket is loosened.

Figure 12. MF-1233-01X Position Indication Application (24 Vac Supply)



Calibration N.C. Damper

1. Position calibration adjustment potentiometer (50K pot.) to mid-position.
2. Run actuator to full CCW (closed) end of rotation.
3. Rotate cal. adjustment until the position indication meter reads "0%" or "closed".

Calibration N.O. Damper

1. Position calibration adjustment potentiometer (50K pot.) to mid-position.
2. Run actuator to full CW (closed) end of rotation.
3. Rotate cal. adjustment until the position indication meter reads "100%".
4. Disconnect terminal #7 from Yel wire and terminal #11 from wiper of cal. adjust pot. Reconnect terminal #7 to wiper of cal. adjust pot. and terminal #11 to Yel wire junction.
5. Loosen clamp screw on large feedback potentiometer gear (some units will not have clamp screw — proceed to step 6). See Figure 4.
6. Rotate large feedback potentiometer gear, (on hub) inside the actuator, by hand or with thin screwdriver in gear slot until the position indication meter reads "0%".
7. Tighten clamp screw [2 lb.-in. (.2 N-m)] on large feedback potentiometer.

CAUTION

Do not loosen potentiometer bracket screws. Warranty will be voided if potentiometer bracket is loosened.

Figure 13. MF-1233-01X Position Indication Application (20 Vdc Supply)

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